United States
Department of
Agriculture

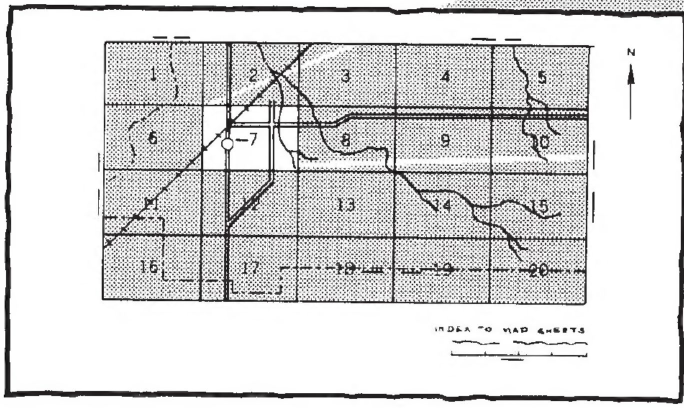
Soil
Conservation
Service

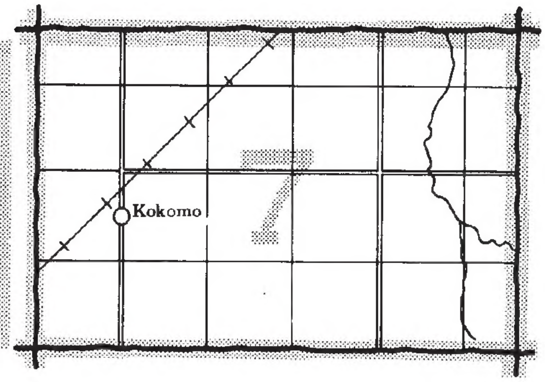
In cooperation with the
United States Department
of the Interior
Bureau of Land
Management and
Fish and Wildlife
Service, and the
Montana Agricultural
Experiment Station

Soil Survey of McCone County Montana

HOW TO USE

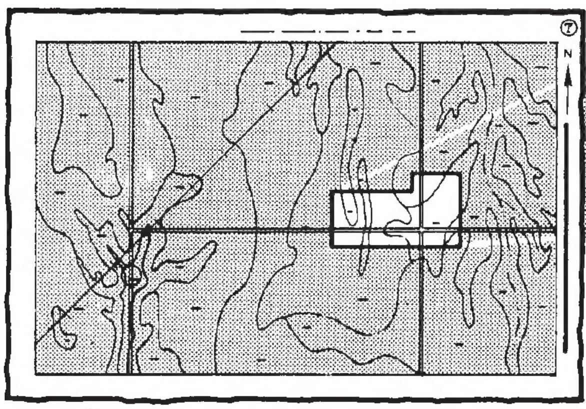
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

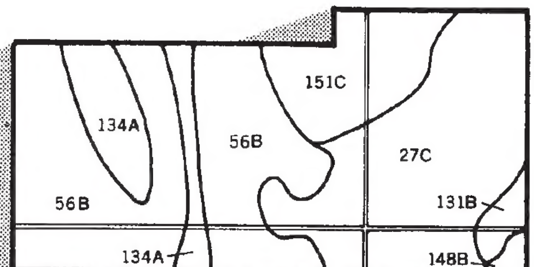




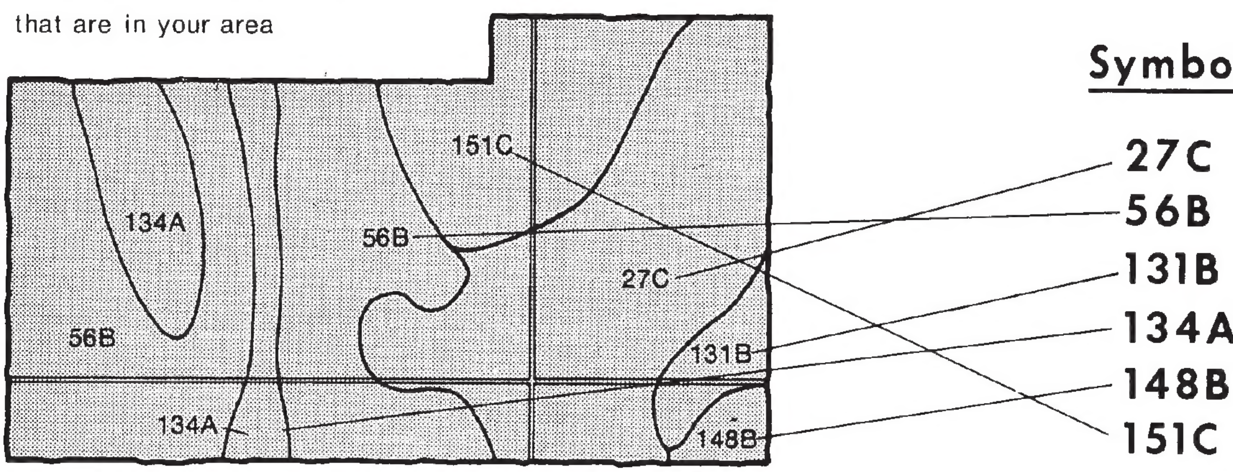
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



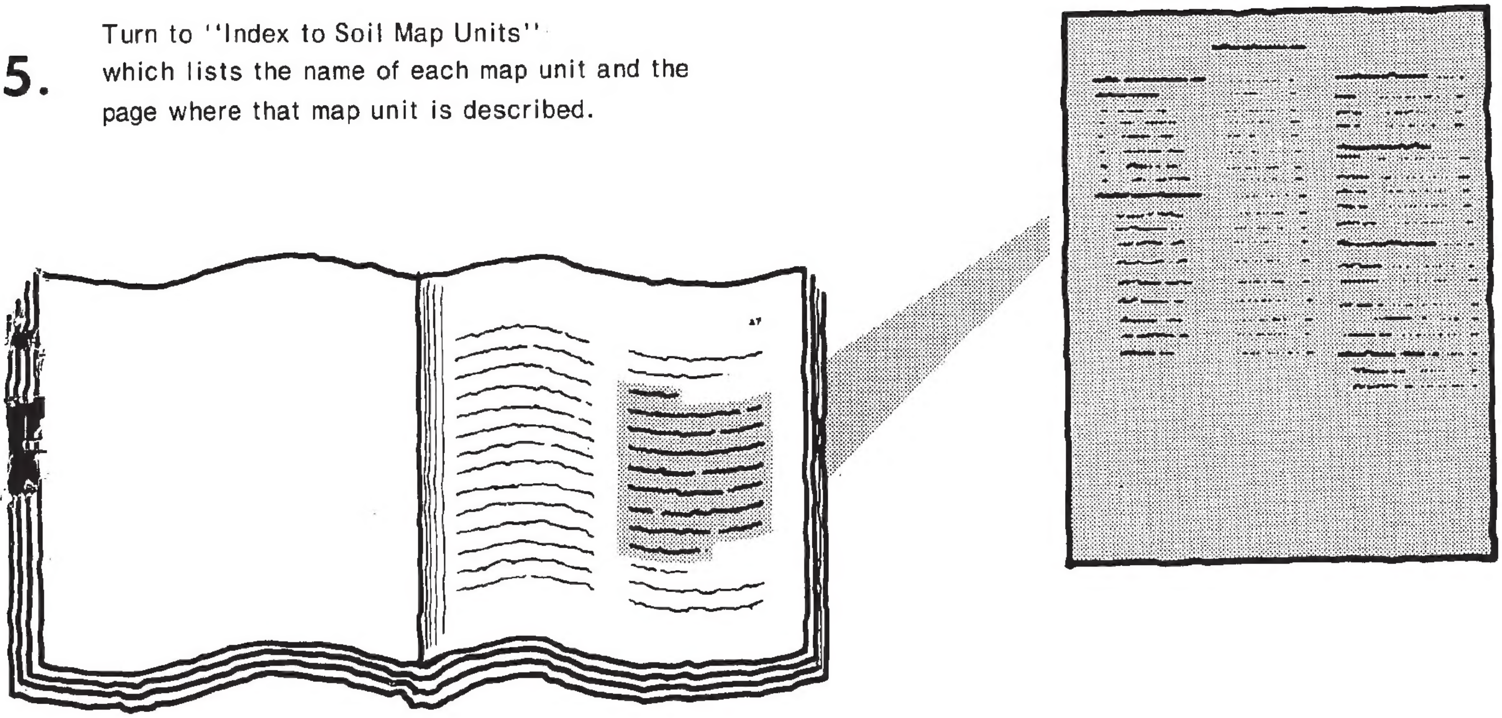


4. List the map unit symbols that are in your area

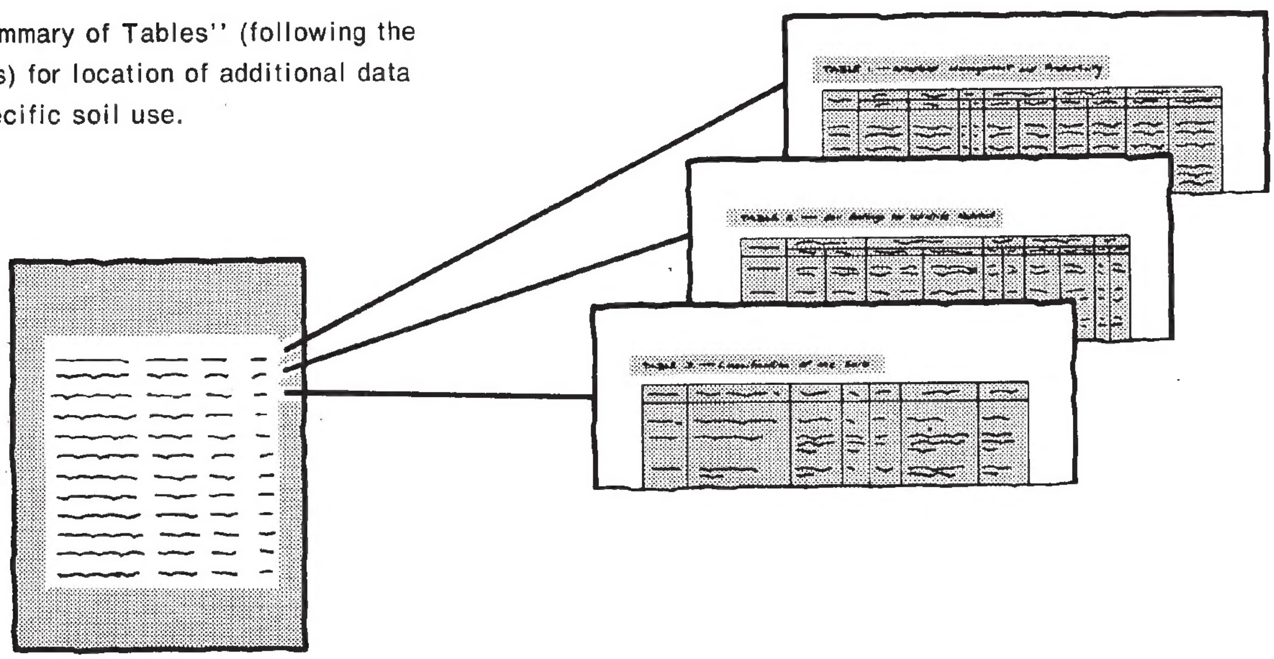


'HIS SOIL SURVEY

5. Turn to ''Index to Soil Map Units'' which lists the name of each map unit and the page where that map unit is described.



6. See ''Summary of Tables'' (following the Contents) for location of additional data on a specific soil use.



7. Consult ''Contents'' for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1972-79. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service, the Bureau of Land Management, the Fish and Wildlife Service, and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the McCone County Conservation District.

Financial assistance was furnished by the Board of County Commissioners, McCone County, and by Burlington Northern Railroad, Inc.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Soil Series

Issued July 1984

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in McCone County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

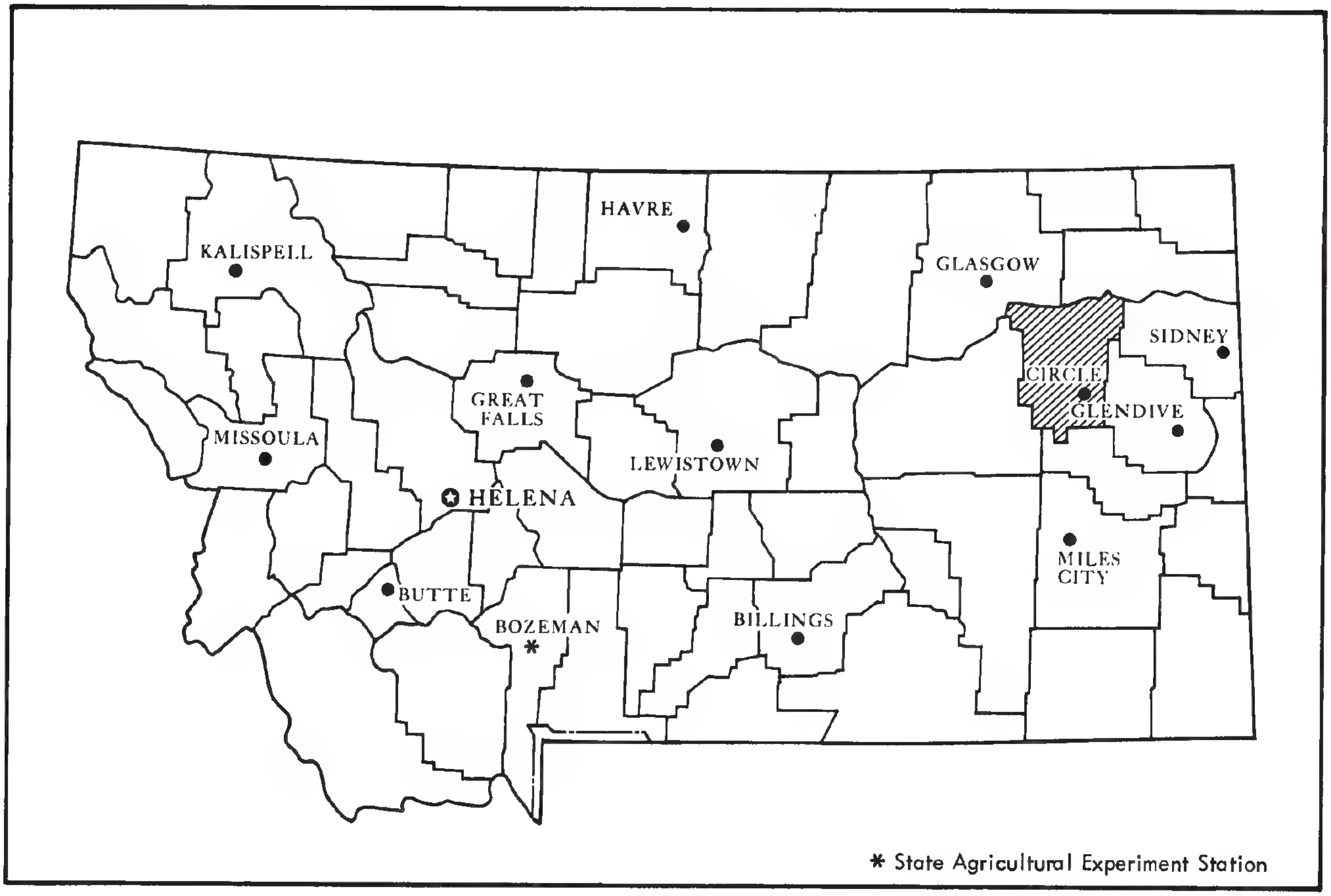
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Glen H. Loomis

Glen H. Loomis
State Conservationist
Bozeman, Montana


HAVRE
KALISPELL
GLASGOW
SIDNEY
CIRCLE
GLENDIVE
GREAT FALLS
MISSOULA
LEWISTOWN
HELENA
MILES CITY
BUTTE
BOZEMAN
BILLINGS
* State Agricultural Experiment Station

Soil Survey of McCone County, Montana

By Donald E. Strom

Fieldwork by Donald E. Strom, Kenneth Drecksel, Edward Brincken, and Kenneth Lucklow, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the United States Department of the Interior, Bureau of Land Management and Fish and Wildlife Service, and the Montana Agricultural Experiment Station

McCONE COUNTY is in the east-central part of Montana. The southern and eastern parts of the county are characterized by gently rolling to strongly rolling hills and terraces, and the western part is characterized by moderately sloping terraces and benches and by rough badland. The county has a total area of about 1,660,160 acres, or 2,594 square miles. About 493,585 acres is used as cropland, 56,003 acres as pastureland, 839,223 acres as rangeland, 4,453 acres as forest land, and 1,943 acres as sites for farmsteads, roads, and feedlots. The remaining 264,953 acres is federal land, urban and built-up areas, and small areas of water.

Descriptions, names, and delineations of the soils in this survey area may not fully agree with those on soil maps for adjacent survey areas. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey area.

General Nature of the Survey Area

This section gives general information concerning the settlement and development, ground water resources, mineral resources, and climate of the survey area.

Settlement and Development

By O. M. Mabry, soil conservationist, Soil Conservation Service.

McCone County was organized on February 12, 1919, and was named in honor of State Senator George McCone.

McCone County is prairie country. Circle, the county seat and largest town, has a population of 960. Vida and Brockway are the other commercial centers.

Fur trappers and buffalo hunters came to this area about 1880. In 1882 Texas longhorns were brought to the area. The first cattle operations had as many as 100,000 head of cattle.

The Northern Pacific Railroad came into the county about 1884. Cattle were shipped by rail from the south and then trailed on to the north.

The Homestead Law of 1862 gave the settlers the right to claim the land they occupied. Thousands of people filed claim on homesteads. Nonirrigated farming became important after 1900. The peak of this movement was reached about 1910. During the droughts in 1917 to 1923 and in 1935 and 1936, many of the homesteaders were forced to move out. Many went to work building Fort Peck Dam. The land was left barren. After 1935, much of the land was restored to grass and farming methods were improved. After the droughts were over, high protein wheat and good barley were produced in the county.

At the present time, there are 510 farms and ranches in the county. The main crops are wheat, oats, barley, and alfalfa hay.

Ground Water Resources

By Eddie Juvan, geologist, Soil Conservation Service.

Most of the water for domestic and livestock use in McCone County is obtained from wells. The wells range from shallow dug wells near the creeks to deep drilled wells in upland areas. They range from 15 feet to more than 900 feet in depth. The towns of Circle, Brockway, and Vida obtain their entire water supply from wells. The Missouri River offers an abundant supply of water for irrigation. This water is not used extensively for domestic purposes because of the large amount of sediment and mineral matter in suspension.

Ground water in the county is present in a variety of aquifers that have been classified as alluvial deposits of sand and gravel, glacial deposits, high terrace deposits of sand and gravel, and formations of sandstone, siltstone, coal, fissill sandy shale, and baked clinker beds (*6*).

Of great significance to the ground water supply of McCone County are the alluvial and low terrace deposits in the river valleys and in the inner valleys of most streams. The alluvial and terrace deposits are the most permeable water-bearing formations in the county. Yields from these aquifers range from 15 to 1,000 gallons per minute.

Consolidated bedrock of significance to ground water supply underlies a large part of the county. Wells penetrating the permeable bedrock provide water for several towns and for some industries, as well as a large percentage of that used for domestic purposes and by livestock. There are many rock formations that are water-bearing, but not all of the formations are present in any given area. The drilling depth required to penetrate a given formation varies with location and elevation.

Water quality tends to vary greatly because of differences in the chemical characteristics and the content of dissolved solids. These variations depend mainly on geology and the precipitation in an area. The permeability and recharge characteristics of the rock in most of McCone County allow ground water to move slowly and pick up dissolved minerals. In areas where shale zones are hydraulically connected to producing aquifers, the water is more highly mineralized. Mineral content of the water generally increases with depth.

The most important bedrock aquifers in McCone County include the Fox Hills Sandstone, Hell Creek Sandstone, and the Tongue River Sandstone and coalbeds. In the northern part of the county, a few wells have penetrated the Judith River Sandstone. This zone is under artesian head, and surface flow of water has been established at low elevations. These artesian wells are primarily along the flood plain of the Missouri River.

Mineral Resources

By Eddie Juvan, geologist, Soil Conservation Service.

Rock and mineral resources can be divided into three groups: (1) metals; (2) fuels, consisting of coal, oil, and gas; and (3) nonmetallic or industrial minerals. McCone County has no metal resources, but it has some potential for the production of natural gas and oil and has a large quantity of valuable coal deposits. Nonmetallic or industrial minerals, with the exception of sand and gravel, have not been mined extensively in McCone County; however, bentonite deposits do occur in Cretaceous shale in the northern and western parts of the county.

Although McCone County is not one of Montana's leading oil- and gas-producing counties, producing wells have been developed (*5*). Extensive exploration for natural gas and oil is being conducted to the east in Richland County. As the search for oil and gas intensifies, many exploratory wells will undoubtedly be drilled in McCone County.

Minable coal resources in McCone County are many. Coal occurs in the Fox Hills and Hell Creek Members of the Lance Formation. These coal deposits are in small isolated areas and are not considered to have high potential for economic exploitation. The Lebo Shale Member of the Fort Union Formation contains several lenses of coal; however, the only deposit that can be traced is the Big Dirty Bed, which reaches a thickness of 20 feet. This bed contains many impurities and varies greatly in quality from place to place. The Big Muddy Coalbed is mined locally in McCone County.

The most promising coalbeds in McCone County are in the Tongue River Member of the Fort Union Formation. There are a number of beds that are variable in thickness but are uniformly of good quality. Many of these beds are near the surface and would be suitable for strip mining.

Nonmetallic or industrial minerals are important resources in McCone County. Sand and gravel deposits of fluvial, glacial, or residual origin are mined extensively. These materials are used in concrete and asphalt, in highway and other road construction, and as ballast on railroads.

Bentonite deposits are in the northwestern part of McCone County; however, extensive mining operations have not been developed. It is mined in areas north and west of the county. If use of this material is intensified, mining could be initiated in McCone County.

Climate

By the National Climatic Center, Asheville, North Carolina.

McCone County generally is quite warm in summer and is characterized by frequent hot days and occasional cool days. It is very cold in winter as a result of the arctic air that frequently surges over the county. Most precipitation falls during the warm period and is normally heaviest late in spring and early in summer. Winter snowfall normally is moderate, and it is blown into drifts so that much of the ground is free of snow.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Brockway, Circle, Vida, and Fort Peck, Montana, for the period 1951 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperatures at Brockway, Circle, Vida, and Fort Peck are 17, 16, 17, and 17 degrees F, respectively. The average daily minimum temperature is 5 degrees at Brockway and Circle and is 7 degrees at Vida and Fort Peck. The lowest temperature recorded, -47 degrees, occurred at

Brockway on February 28, 1962. In summer the average temperature is 66 to 68 degrees at Brockway, Circle, and Vida and is 69 degrees at Fort Peck. The average daily maximum temperature is about 83 degrees. The highest recorded temperature, which occurred at Vida on July 19, 1960, is 109 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 12 to 13 inches at Brockway and Fort Peck, 15 inches at Circle, and 16 inches at Vida. Of this, 80 percent usually falls in April through September, which includes the growing season for most crops. The heaviest 1-day rainfall during the period of record was 3.99 inches at Fort Peck on June 18, 1964. Thunderstorms occur on about 27 days each year, and most occur in summer.

Average seasonal snowfall is 12 inches at Brockway, 36 inches at Circle, 14 inches at Fort Peck, and 47 inches at Vida. The greatest snow depth at any one time during the period of record was 33 inches. On the average, 4 days at Brockway and Fort Peck, 81 days at Circle, and 50 days at Vida have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 75 percent. The sun shines 80 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the west. Average windspeed is highest, 12 miles per hour, in spring.

Several times each winter storms with snow and high winds bring blizzard conditions to the area. Hail occurs during summer thunderstorms in small, scattered areas.

How this Survey was Made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General Soil Map Units" and "Detailed Soil Map Units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The 22 general map units in this survey area have been grouped into five general kinds of landscape for broad interpretative purposes. Each of the broad groups and the map units in each group are described in the following pages.

Dominantly nearly level alluvial soils that are deep and well drained; on terraces and flood plains

This group consists of three map units. It makes up about 9.5 percent of the county. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 10 to 16 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is 90 to 125 days.

The soils in this group are deep and well drained. They formed in alluvium along the Missouri River, Redwater River, Prairie Elk Creek, Timber Creek, and their tributaries.

This group is used mainly for irrigated and nonirrigated crops. It is also used as rangeland.

1. Cherry-Havrelon-Trembles

Loamy, moist soils that are nearly level and gently sloping and are subject to flooding

This map unit is on smooth terraces and flood plains along the Redwater River and its tributaries. The unit is subject to rare or occasional periods of flooding. Slope is 0 to 4 percent.

This unit makes up about 3.5 percent of the county. It is about 40 percent Cherry and similar soils, 20 percent Havrelon soils, and 15 percent Trembles soils. The remaining 25 percent is soils of minor extent.

Cherry soils are on higher terraces. The surface layer is light brownish gray silt loam. The subsoil is mostly pale yellow and light brownish gray silt loam. The substratum is mostly light brownish gray silt loam.

Havrelon soils are on low terraces and flood plains. The surface layer is pale brown loam, and the underlying material is pale brown very fine sandy loam.

Trembles soils are on terraces and flood plains. The surface layer is grayish brown fine sandy loam, and the underlying material is yellowish brown and light brownish gray fine sandy loam.

Of minor extent in this unit are poorly drained Typic Fluvaquents and Typic Fluvaquents, saline, in stream channels and on flood plains; Alona soils on terraces; and Banks soils on flood plains and low terraces. Also included are soils on short, steep slopes along terrace edges.

Most areas of this unit are used for nonirrigated and irrigated farming. Wheat, oats, barley, and alfalfa hay are the primary crops. The unit is used as rangeland in areas where it is dissected by stream channels and farming is not practical.

The hazard of soil blowing is the major limitation of this unit for cultivated crops. A good ground cover of straw mulch or stubble helps to control soil blowing. This unit responds well to proper grazing use and planned grazing systems. If overgrazed, it can be treated by mechanical methods, such as chiseling, or reseeded with adapted plants.

This unit is poorly suited to homesite development because of the hazard of flooding.

2. Harlem-Havre-Glendive

Clayey and loamy, dry soils that are nearly level and are protected from flooding

This map unit is on smooth terraces and the flood plain of the Missouri River, along the northern edge of the county. Most of this unit is protected from flooding by the Fort Peck Dam. Slope is 0 to 2 percent.

This map unit makes up about 3.5 percent of the county. It is about 50 percent Harlem and similar soils,

25 percent Havre soils, and 15 percent Glendive soils. The remaining 10 percent is soils of minor extent.

Harlem soils are on terraces and in old oxbows on flood plains. The surface layer is grayish brown silty clay, and the underlying material is light brownish gray and grayish brown silty clay.

Havre soils are on terraces. The surface layer is light brownish gray silt loam, and the underlying material is light brownish gray silt loam with thin lenses of fine sandy loam.

Glendive soils are on terraces. The surface layer is grayish brown loam, and the underlying material is grayish brown fine sandy loam with thin lenses of loamy fine sand.

Of minor extent in this unit are very poorly drained Dimmick soils in basins and on lake beds; Pendroy soils on terraces; Harlem, Havre, and Glendive soils that are flooded and are on low terraces and the edges of the flood plain; and soils in the eastern parts of the unit that receive more rainfall.

About 85 percent of the unit has been cleared of cottonwood trees. Most of the cleared areas are used for nonirrigated and irrigated farming. The remaining areas are grazed. Wheat, oats, barley, and alfalfa hay are the main crops grown.

The hazard of soil blowing is the major limitation of this unit for use as cropland.

3. Lonna-Havre-Glendive

Loamy, dry soils that are nearly level and are subject to flooding

This map unit is on smooth terraces and flood plains along Timber and Prairie Elk Creeks. The Havre and Glendive soils are subject to rare or occasional periods of flooding. Slope is 0 to 2 percent.

This unit makes up about 2.5 percent of the county. It is about 30 percent Lonna and similar soils, 25 percent Havre soils, and 20 percent Glendive soils. The remaining 25 percent is soils of minor extent.

The Lonna soils are generally on the higher terraces. The surface layer is brown silty clay loam. The subsoil is very pale brown silty clay loam and silt loam.

The Havre soils are generally on low terraces and flood plains. The surface layer is light brownish gray silt loam, and the underlying material is light brownish gray silt loam with thin lenses of fine sandy loam.

The Glendive soils are generally on low terraces and flood plains. The surface layer is grayish brown loam, and the underlying material is grayish brown fine sandy loam with thin lenses of loamy fine sand.

Of minor extent in this unit are the Alona soils on terraces and fans; poorly drained Typic Fluvaquents, saline, in stream channels; and excessively drained Hanly soils on terraces and flood plains. Also included are soils on short, steep slopes along terrace edges.

Most areas of this unit are used for nonirrigated crops. Some areas are irrigated by diversions and border dikes. Wheat, oats, barley, and alfalfa hay are the primary crops. The unit is used as rangeland in areas where it is dissected by stream channels and farming is not practical.

The hazard of soil blowing is the main limitation of this unit for cultivated crops. A good ground cover of straw mulch or stubble helps to control soil blowing. If overgrazed, the unit can be treated by mechanical methods, such as chiseling, or reseeded with adapted plants.

This unit is poorly suited to homesite development because of the hazard of flooding.

Dominantly undulating to hilly soils that are deep and well drained; on glaciated plains

This group consists of four map units. It makes up about 16 percent of the county. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 to 16 inches, the average annual air temperature is 43 degrees F, and the average frost-free season is 90 to 125 days.

The soils in this group are deep and well drained. They formed in glacial till and alluvium.

This group is used mainly for nonirrigated farming. It is also used as rangeland.

4. Williams-Zahill

Loamy, moist soils that are nearly level to strongly rolling and formed in glacial till

This map unit is on rolling uplands and low hills in the northeastern part of the county. Slope is 0 to 15 percent.

This map unit makes up about 8 percent of the county. It is about 50 percent Williams and similar soils and 35 percent Zahill soils. The remaining 15 percent is soils of minor extent.

Williams soils generally are on side slopes and in swales. The surface layer is dark grayish brown loam. The subsoil is dark grayish brown and brown clay loam. The substratum is light gray and light olive gray clay loam.

Zahill soils generally are on upper side slopes and ridges of hills. The surface layer is brown loam, and the underlying material is mostly light brownish gray clay loam.

Of minor extent in this unit are moderately sodium-affected Thoeny soils on fans and foot slopes; strongly sodium- and salt-affected Adger soils on fans; and Shambo and Farnuf soils on fans and foot slopes.

Most areas of this unit are used for nonirrigated farming. Small areas on uplands and creek bottoms are used as rangeland and pastureland. Because the unit receives an average of 15 inches of precipitation per year, it produces good crop yields.

5. Zahill-Vida

Loamy, moist soils that are undulating to hilly and formed in glacial till

This map unit is on hills and ridges and in swales and valleys in the northeastern part of the county. The ridges are generally aligned in an east-west orientation, separating the major creeks. Slope is 2 to 25 percent.

This unit makes up about 5.5 percent of the county. It is about 45 percent Zahill and similar soils and 30 percent Vida soils. The remaining 25 percent is soils of minor extent.

Zahill soils generally are on side slopes and ridges of hills. The surface layer is brown loam, and the underlying material is mostly light brownish gray clay loam.

Vida soils generally are on the lower side slopes and in swales. The surface layer is brown clay loam. The subsoil is mostly light brownish gray loam. The substratum is light gray clay loam.

Of minor extent in this unit are shallow, well drained Cabba soils on ridges of hills; moderately salt-affected and strongly sodium-affected Alona soils on terraces of creeks; and Bryant and Shambo soils on fans and terraces.

About half of this unit is used for nonirrigated crops, and the rest is used as rangeland. Nonirrigated farming is concentrated in the less hilly areas and on upland benches. The hazard of soil blowing and the potential for saline seeps are the main limitations of the unit for use as cropland.

6. Telstad-Hillon

Loamy, dry soils that are undulating to strongly rolling and formed in glacial till

This map unit is on undulating uplands and hills, in swales, and on low ridges in the northwestern part of the county. Slope is 2 to 15 percent.

This unit makes up about 1.5 percent of the county. It is about 40 percent Telstad and similar soils and 40 percent Hillon soils. The remaining 20 percent is soils of minor extent.

Telstad soils generally are on the lower side slopes and in swales. The surface layer is dark grayish brown loam. The subsoil is grayish brown clay loam and light gray loam. The substratum is light brownish gray loam.

Hillon soils generally are on hills and the upper side slopes. The surface layer is grayish brown loam, and the underlying material is mostly light gray loam.

Of minor extent in this unit are the moderately sodium-affected Thoeny soils in sparsely vegetated, shallow, depressional areas on fans of uplands and Evanston soils on fans and terraces.

About 50 percent of this unit is used for nonirrigated farming. The rest is used as rangeland. Farming is concentrated on the undulating uplands and low hills. The hazard of soil blowing is the main limitation of the unit for use as cropland.

7. Gerdrum-Hillon

Loamy, dry soils that are nearly level to hilly and formed in salt- and sodium-affected alluvium and in glacial till

This map unit is on smooth fans, side slopes, and hills of glaciated uplands, mostly in the west-central part of the county. The side slopes and fans generally are long and smooth. The fans and side slopes are characterized by small, sparsely vegetated, shallow, depressional areas. Slope is 0 to 25 percent.

This unit makes up about 1 percent of the county. It is about 40 percent Gerdrum and similar soils and about 40 percent Hillon soils. The remaining 20 percent is soils of minor extent.

Gerdrum soils generally are on fans and foot slopes of hills. They formed in salt- and sodium-affected alluvium. The surface layer is light brownish gray clay loam. The subsoil is mainly light brownish gray clay and clay loam. The substratum is light brownish gray clay loam.

Hillon soils generally are on the upper side slopes and ridges of hills. They formed in glacial till. The surface layer is grayish brown loam, and the underlying material is mostly light gray loam.

Of minor extent in this unit are moderately sodium-affected Thoeny soils on fans; Typic Fluvaquents, saline, on creek bottoms; and Boxwell soils on terraces.

This unit is used mainly as rangeland. Some small areas of the minor soils are used for nonirrigated farming. This unit responds well to planned grazing systems and some mechanical methods of range improvement.

Dominantly strongly rolling to steep soils that are shallow to deep and well drained and somewhat excessively drained; on glaciated plains

This group consists of five map units. It makes up about 16.5 percent of the county. Elevation is about 2,000 to 2,600 feet. The average annual precipitation is about 12 to 16 inches, the average annual air temperature is 43 degrees F, and the frost-free season is 90 to 125 days.

The soils in this group are shallow to deep and are well drained and somewhat excessively drained. They formed in glacial till, weakly consolidated sedimentary beds, and alluvium.

This group is used mainly as rangeland. A few areas on the lower side slopes are used for nonirrigated farming. Areas of Badland are used for wildlife habitat, watershed, and recreation.

8. Zahill-Cabba

Loamy, moist soils that are deep and shallow, are strongly rolling to steep, and formed in glacial till and material derived from weakly consolidated, sandy and silty sedimentary beds

This map unit is in the northeastern part of the county. It is mainly on strongly rolling uplands that are dissected by deeply entrenched coulees. Some areas are on smooth benches of uplands and on terraces. Slope is 8 to 45 percent.

This unit makes up about 7 percent of the county. It is about 55 percent Zahill and similar soils and 30 percent Cabba soils. The remaining 15 percent is soils of minor extent.

Zahill soils are deep and generally are on side slopes and ridges of hills on uplands. The surface layer is brown loam, and the underlying material is pale brown and light brownish gray clay loam.

Cabba soils are shallow and generally are on ridges of hills and side slopes of coulees. The surface layer is light yellowish brown loam. The underlying material is light yellowish brown and pale yellow loam over weakly consolidated, sandy and silty sedimentary beds.

Of minor extent in this unit are moderately sodium-affected and strongly salt-affected Alona soils on terraces, Dast soils on ridges of some hills, and Vida soils in the smoother upland areas.

Most of this unit is used as rangeland. The smoother areas and some areas of the minor soils are used for nonirrigated farming. This unit responds well to planned grazing systems and proper grazing use. The less sloping areas are suitable for mechanical treatment and seeding to adapted plants.

9. Zahill-Badland

Loamy, moist soils that are deep, are hilly to very steep, and formed in glacial till, and Badland

This map unit is in the northeastern part of the county. It is on high, narrow hills and ridges, in areas dissected and eroded by streams, and on small rolling upland benches between coulees. Slope is 15 to 45 percent.

This unit makes up about 1 percent of the county. It is about 45 percent Zahill and similar soils and about 30 percent Badland. The remaining 25 percent is soils of minor extent.

Zahill soils generally are on the vegetated side slopes of coulees and the upper side slopes of hills and ridges. The surface layer is brown loam, and the underlying material is pale brown and light brownish gray clay loam.

Badland generally is in steep and very steep coulees and on narrow ridges and buttes. It consists mainly of eroded and exposed, weakly consolidated, silty and sandy sedimentary beds and semiconsolidated shale.

Of minor extent in this unit are Vida and Williams soils on upland benches, moderately sodium-affected and strongly salt-affected Gerdrum soils on fans below areas of Badland, and Cabba soils on ridges of some hills.

Nearly all of this unit is used as rangeland. Some small areas of the minor soils on upland benches are used for nonirrigated farming. This unit responds well to planned grazing systems and proper grazing use. It is poorly suited to mechanical treatment for range improvement because of steepness of slope and the areas of Badland.

10. Sunburst-Fleak-Busby

Loamy and sandy, dry soils that are deep and shallow, are hilly and steep, and formed in glacial till, in material derived from weakly consolidated sandy sedimentary beds, and in alluvium

This map unit is in the northwestern part of the county. It is on high hills and in deeply entrenched areas. Slope is 15 to 45 percent.

This unit makes up about 4.5 percent of the county. It is about 30 percent Sunburst and similar soils, 25 percent Fleak soils, and 25 percent Busby soils. The remaining 20 percent is soils of minor extent.

Sunburst soils are deep and generally are on ridges and upper side slopes of hills capped with glacial till. They formed in glacial till. The surface layer is grayish brown clay loam, and the underlying material is mostly grayish brown silty clay.

Fleak soils are shallow and generally are on ridges and upper side slopes of hills. They formed in weakly consolidated sedimentary beds. The surface layer is olive brown loamy sand. The underlying material is olive loamy sand over weakly consolidated, sandy sedimentary beds.

Busby soils are deep and generally are on lower side slopes and in swales. They formed in alluvium. The surface layer is grayish brown fine sandy loam. The subsoil is light olive brown fine sandy loam. The substratum is mostly light brownish gray fine sandy loam.

Of minor extent in this unit are shallow Neldore soils on shale hills and ridges; Yamac soils on lower side slopes; moderately sodium-affected and strongly salt-affected Gerdrum soils on some fans below shale outcroppings; and Kremlin soils on fans, terraces, and smooth side slopes of uplands.

This unit is used as rangeland. It responds well to planned grazing systems and proper grazing use. It is very poorly suited to mechanical range improvement.

11. Hillon

Loamy, dry soils that are deep, are strongly rolling to steep, and formed in glacial till

This map unit is in the northwestern part of the county. It is on high hills and ridges and in deeply entrenched areas. The unit is drained by many small creeks that have actively eroded, deep coulees and channels in the glacial till mantle. Slope is 8 to 45 percent.

This unit makes up about 2 percent of the county. It is about 75 percent Hillon and similar soils. The remaining 25 percent is soils of minor extent.

Hillon soils generally are on the sides and tops of hills and ridges. The surface layer is grayish brown loam, and the underlying material is mostly light gray loam.

Of minor extent in this unit are shallow Fleak soils in areas where the glacial till cap has been eroded, moderately sodium-affected Gerdrum and Rominell soils on fans below areas of Badland, and Telstad soils on smooth upland benches. Also included are small areas of Badland.

This unit is used as rangeland. It responds well to planned grazing systems and proper grazing use. It is poorly suited to treatment by mechanical range improvement methods because of steepness of slope.

12. Hillon-Badland

Loamy, dry soils that are deep, are hilly and steep, and formed in glacial till, and Badland

This map unit is in the north-central part of the county. It is on high, narrow hills and ridges and in areas that are dissected and eroded by streams. Slope is 15 to 45 percent.

This unit makes up about 2 percent of the county. It is about 40 percent Hillon and similar soils and about 30 percent Badland. The remaining 30 percent is soils of minor extent.

Hillon soils generally are on side slopes and ridges of hills. The surface layer is grayish brown loam, and the underlying material is mostly light gray loam.

Badland generally is in steep and very steep coulees and on narrow ridges and buttes. It consists mainly of eroded and exposed, weakly consolidated, silty and sandy sedimentary beds and consolidated shale.

Of minor extent in this unit are Telstad soils on upland benches, moderately sodium-affected and strongly salt-affected Gerdrum soils on fans below areas of Badland, and Kremlin soils on fans and terraces.

This unit is used mainly as rangeland. It responds well to planned grazing systems and proper grazing use. The unit is very poorly suited to mechanical methods of range improvement because of the slope and areas of Badland.

Dominantly gently sloping to moderately steep soils that are shallow to deep and are well drained; on sedimentary uplands

This group consists of five map units. It makes up about 38 percent of the county. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 43 degrees F, and the average frost-free season is 90 to 125 days.

The soils in this group are shallow to deep and are well drained. They formed in alluvium and material derived from weakly consolidated, sandy and silty sedimentary beds.

This group is used mainly for nonirrigated farming. It is also used as rangeland.

13. Cambert-Bryant

Loamy, moist soils that are moderately deep and deep, are nearly level to strongly sloping, and formed in alluvium and in material derived from weakly consolidated, silty sedimentary beds

This map unit is in the southeastern part of the county. It is on long, smooth fans and terraces and low hills and ridges. The streams that drain this unit have pronounced channels and flood plains that are defined by sharp terrace edges. Slope is 0 to 15 percent.

This unit makes up about 19 percent of the county. It is about 55 percent Cambert and similar soils and 20 percent Bryant soils. The remaining 25 percent is soils of minor extent.

Cambert soils are moderately deep and generally are on side slopes and tops of hills and ridges. They formed in weakly consolidated, silty sedimentary beds. The surface layer is brown loam. They formed in weakly consolidated, silty sedimentary beds. The subsoil is mostly brown loam. The substratum is very pale brown silty clay loam. Below this are weakly consolidated, silty sedimentary beds.

Bryant soils are deep and generally are on fans and terraces and in swales. They formed in alluvium. The surface layer is dark grayish brown silt loam. The subsoil is dark grayish brown and grayish brown silt loam and light brownish gray silty clay loam. The substratum is mostly light gray silty clay loam.

Of minor extent in this unit are Cabba and Dast soils on ridges of hills, moderately sodium-affected and strongly salt-affected Alona soils on some terraces, and Lisk soils in swales and on lower side slopes of hills.

About 60 percent of this unit is used for nonirrigated farming. The remaining 40 percent is used as rangeland. There are no major limitations of the unit for use as cropland, but the hazards of soil blowing and water erosion can be severe in large areas of barren fallowed land. This unit is suitable for mechanical rangeland improvement practices and for planting adapted grasses.

14. Cabba-Cambert

Loamy, moist soils that are shallow and moderately deep, are gently sloping to moderately steep, and formed in material derived from weakly consolidated, sandy and silty sedimentary beds

This map unit is in the southeastern part of the county. It is on short to medium side slopes of fans and on hills and ridges on uplands. The hills and ridges have moderately steep side slopes and rounded tops. The hills separate small drainageways in the unit. Slope is 2 to 25 percent.

This unit makes up about 5.5 percent of the county. It is about 40 percent Cabba and similar soils and 30 percent Cambert soils. The remaining 30 percent is soils of minor extent.

Cabba soils are shallow and generally are on the tops and upper side slopes of hills and ridges. The surface layer is light yellowish brown loam. The underlying material is light yellowish brown and pale yellow loam over weakly consolidated, sandy and silty sedimentary beds.

Cambert soils are moderately deep and generally are on the lower side slopes of hills and in swales. The surface layer is brown loam. The subsoil is mostly brown loam. The substratum is very pale brown silty clay loam. Below this is weakly consolidated, silty sedimentary beds.

Of minor extent in this unit are Bryant and Shambo soils in swales and on fans, Dast soils on ridges, and gravelly Wabek soils on the tops of some hills.

About 60 percent of this unit is used as rangeland, and 40 percent is used for nonirrigated farming. The hazards of soil blowing and water erosion are the main limitations of this unit for use as cropland. This unit responds well to planned grazing systems and proper grazing use. It is suitable for treatment by mechanical rangeland improvement practices and for seeding to adapted grasses.

15. Cabbart-Busby

Loamy, dry soils that are shallow and deep, are moderately sloping to moderately steep, and formed in material derived from weakly consolidated, sandy and silty sedimentary beds and in alluvium

This map unit is mainly on fans, hills, and ridges on uplands in the west-central part of the survey area. The unit is dissected by coulees and drainageways. Slope is 4 to 25 percent.

This unit makes up about 8 percent of the county. It is about 50 percent Cabbart and similar soils and 30 percent Busby soils. The remaining 20 percent is soils of minor extent.

Cabbart soils are shallow and generally are on side slopes and tops of hills and ridges on uplands. They formed in weakly consolidated, sandy and silty sedimentary beds. The surface layer is grayish brown silt loam. The underlying material is pale olive silt loam over weakly consolidated, sandy and silty sedimentary beds.

Busby soils are deep and generally are on fans and side slopes of hills and in swales. They formed in alluvium. The surface layer is grayish brown fine sandy loam. The subsoil is light olive brown fine sandy loam. The substratum is mostly light brownish gray fine sandy loam.

Of minor extent in this unit are Yamac, Kremlin, and Chinook soils in swales and on fans and Fleak soils on ridges of hills.

About 75 percent of this unit is used as rangeland, and the remaining 25 percent is used for nonirrigated farming. The main limitations of the unit for use as cropland are steepness of slope and the high hazard of soil blowing. The unit responds well to proper grazing use and planned grazing systems. It is suitable for treatment by mechanical rangeland improvement practices and for seeding to adapted grasses.

16. Cambeth-Floweree

Loamy, dry soils that are moderately deep and deep, are gently sloping to strongly sloping, formed in local alluvium and in material derived from weakly consolidated, silty sedimentary beds

This map unit is in the southwestern part of the county. It is on smooth fans and terraces and on hills and ridges on uplands. The unit is drained by small tributaries of Timber Creek. Slope is 2 to 15 percent.

This unit makes up about 4.5 percent of the county. It is about 40 percent Cambeth and similar soils and 30 percent Floweree soils. The remaining 30 percent is soils of minor extent.

Cambeth soils are moderately deep and generally are on the upper side slopes and ridges of hills on uplands. They formed in weakly developed, silty sedimentary beds. The surface layer is brown silt loam. The subsoil is mostly light yellowish brown silt loam. The substratum is pale yellow silt loam. Below this is white, weakly consolidated, silty sedimentary beds.

Floweree soils are deep and generally are on fans, terraces, and the lower side slopes of hills. They formed in alluvium. The surface layer is grayish brown silt loam. The subsoil is mostly light brownish gray silt loam. The substratum is light brownish gray silt loam and grayish brown silty clay loam.

Of minor extent in this unit are Cabbart and Fleak soils on ridges and tops of hills, Busby and Chinook soils in swales and on fans, and Typic Fluvaquents, saline, in creek channels.

About 60 percent of this unit is used as rangeland. The remaining 40 percent is used for nonirrigated farming. The hazards of soil blowing and water erosion are only minor limitations for use of the unit as cropland. This unit responds well to proper grazing use and planned grazing systems. It is also suited to mechanical methods of rangeland improvement and to seeding of adapted grasses.

17. Gerdrum-Busby-Yamac

Loamy, dry soils that are deep, are moderately sloping to moderately steep, and formed in alluvium

This map unit is in the west-central part of the county. It is on long, smooth fans and terraces, low hills, and narrow ridges and in deeply entrenched coulees. This unit is dissected by many small drainageways that flow into Rock Creek and Fort Peck Lake. Slope is 4 to 25 percent.

This unit makes up about 1 percent of the county. It is about 35 percent Gerdrum and similar soils, 20 percent Busby soils, and 20 percent Yamac soils. The remaining 25 percent is soils of minor extent.

Gerdrum soils generally are on fans and terraces below areas of exposed shale and Badland. The surface layer is light brownish gray clay loam. The subsoil is mainly light brownish gray clay and clay loam. The substratum is light brownish gray clay loam.

Busby soils generally are on fans and side slopes of hills and in swales. The surface layer is grayish brown fine sandy loam. The subsoil is light olive brown fine sandy loam. The substratum is mostly light brownish gray fine sandy loam.

Yamac soils generally are on fans and side slopes of hills and in swales. The surface layer is grayish brown loam. The subsoil is olive and grayish brown loam. The substratum is pale olive loam.

Of minor extent in this unit are Fleak and Yawdim soils on the tops of hills and ridges, Chinook and Evanston soils on fans, and areas of Badland.

This unit is used mainly as rangeland. Only small areas, generally areas of the minor soils, are used for nonirrigated farming. This unit responds well to planned grazing systems and proper grazing use. It is suited to mechanical rangeland improvement practices.

Dominantly strongly sloping to steep soils that are shallow to deep and well drained to excessively drained; on sedimentary uplands

This group consists of five map units. It makes up about 20 percent of the county. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 43 degrees F, and the average frost-free season is 90 to 125 days.

The soils in this group are shallow to deep and well drained to excessively drained. They formed in material derived from weakly consolidated, silty and sandy sedimentary beds, consolidated shale, and alluvium.

This group is used mainly as rangeland. A few small areas on the lower side slopes are used as nonirrigated cropland. Areas of Badland are used for watershed, wildlife habitat, and recreation.

18. Cabba-Dast-Wabek

Loamy, moist soils that are shallow to deep, are strongly sloping to steep, and formed in material derived from weakly consolidated, silty and sandy sedimentary beds and in gravelly alluvium

This map unit is in the southeastern part of the county. It is on long, high hills and ridges that separate the creeks. Slope is 8 to 45 percent.

This unit makes up about 2 percent of the county. It is about 40 percent Cabba and similar soils, 25 percent Dast soils, and 15 percent Wabek soils. The remaining 20 percent is soils of minor extent.

Cabba soils are shallow and generally are on side slopes and ridges of hills. The surface layer is light yellowish brown loam. The underlying material is light yellowish brown and pale yellow loam over weakly consolidated, sandy and silty sedimentary beds.

Dast soils are moderately deep and generally are on the upper side slopes of hills and ridges. The surface layer is brown fine sandy loam. The underlying material is light gray and very pale brown fine sandy loam over pale yellow, weakly consolidated, sandy sedimentary beds.

Wabek soils are deep and generally are on the tops of hills and ridges and on benches. The surface layer is grayish brown sandy loam, and the underlying material is light gray very gravelly sand.

Of minor extent in this unit are Shambo and Macar soils on fans and in swales and Cambert soils on lower side slopes.

Nearly all this unit is used as rangeland. Some small areas on benches are used for nonirrigated farming. This unit responds well to planned grazing systems are proper grazing use. It is poorly suited to mechanical methods of rangeland improvement because of steepness of slope.

19. Cabba-Badland

Loamy, moist soils that are shallow, are moderately steep to steep, and formed in material derived from weakly consolidated, sandy and silty sedimentary beds, and Badland

This map unit is in the southeastern part of the county. It is on high hills and ridges, in deeply entrenched coulees, and on isolated buttes. Slope is 8 to 45 percent.

This unit makes up about 1 percent of the county. It is about 40 percent Cabba and similar soils and 35 percent Badland. The remaining 25 percent is soils of minor extent.

Cabba soils generally are on isolated buttes and upper side slopes and tops of hills and ridges. The surface layer is light yellowish brown loam. The underlying material is light yellowish brown and pale yellow loam over weakly consolidated, sandy and silty sedimentary beds.

Badland generally is in steep and very steep coulees and on narrow ridges and buttes. It consists mainly of eroded and exposed, weakly consolidated, sandy and silty sedimentary beds and semiconsolidated shale.

Of minor extent in this unit are Dast soils on hilltops, Shambo soils on fans, and Cambert soils on some of the larger benches and hilltops.

This unit is suited to use as rangeland, as watershed, and for recreation. It responds well to planned grazing systems and proper grazing use. It is very poorly suited to mechanical rangeland improvement practices because of the steepness of slope and the areas of Badland.

20. Badland-Gerdrum-Cabbart

Badland, and loamy, dry soils that are deep and shallow,

are strongly sloping to steep, and formed in salt- and sodium-affected alluvium and in material derived from weakly consolidated, sandy and silty sedimentary beds

This map unit is in deeply entrenched coulees, on isolated buttes and ridges, on long, smooth fans, and on uplands. It is mainly in the western part of the county. Slope is 8 to 45 percent.

This unit makes up about 9.5 percent of the county. It is about 35 percent Badland, 20 percent Gerdrum and similar soils, and 20 percent Cabbart soils. The remaining 25 percent is soils of minor extent.

Badland generally is in steep coulees and on narrow ridges and buttes. It consists mainly of eroded and exposed, weakly consolidated sedimentary beds of siltstone, shale, and sandstone.

Gerdrum soils are deep and generally are on fans and terraces below areas of Badland. The surface layer is light brownish gray clay loam. The subsoil is mainly light brownish gray clay and clay loam. The substratum is mostly light brownish gray clay loam.

Cabbart soils are shallow and generally are on the tops of some hills and in smooth or strongly sloping areas of uplands. The surface layer is grayish brown silt loam. The underlying material is pale olive silt loam over weakly consolidated, sandy and silty sedimentary beds.

Of minor extent in this unit are shallow Fleak and Yawdim soils on the upper side slopes and ridges of hills, Yamac and Kremlin soils on fans below areas of Fleak soils, and Sunburst soils on the tops of hills in the northern part of the unit.

This unit is used primarily as rangeland. It is not suited to cultivated crops because of the areas of Badland, the moderately sodium-affected and strongly salt-affected Gerdrum soils, and slope. Small areas of the minor soils on fans and terraces are used as cropland. This unit responds well to proper grazing use and planned grazing systems. Less sloping areas are suitable for mechanical range improvement practices.

21. Cabbart-Busby-Badland

Loamy, dry soils that are shallow and deep, are moderately steep and steep, and formed in material derived from weakly consolidated, sandy and silty sedimentary beds and in alluvium, and Badland

This map unit is on high hills and ridges and short fans and in deeply entrenched coulees. It is in the west-central part of the county. Slope is 15 to 45 percent.

This unit makes up about 5 percent of the county. It is about 30 percent Cabbart and similar soils, 25 percent Busby soils, and 20 percent Badland. The remaining 25 percent is soils of minor extent.

Cabbart soils are shallow and generally are on the tops and upper side slopes of hills and ridges. The surface layer is grayish brown silt loam. The underlying material is pale olive silt loam over weakly consolidated, sandy and silty sedimentary beds.

Busby soils are deep and generally are on fans and side slopes of hills and in swales. The surface layer is grayish brown fine sandy loam. The subsoil is light olive brown fine sandy loam. The substratum is pale brown and light brownish gray fine sandy loam.

Badland generally is in steep and very steep coulees and on narrow ridges and buttes. It consists mainly of eroded and exposed, soft sedimentary beds of siltstone, shale, and sandstone.

Of minor extent in this unit are shallow Yawdim soils on the upper side slopes and tops of hills and Gerdrum soils on fans below areas of Badland.

Nearly all this unit is used as rangeland. A few small areas, mainly of the minor soils, are used as cropland.

This unit responds well to planned grazing systems and proper grazing use. The less sloping areas are suitable for mechanical methods of rangeland improvement and for seeding to adapted species.

22. Neldore-Bascovy-Badland

Clayey, dry soils that are shallow and moderately deep, are moderately steep and steep, and formed in material derived from consolidated shale, and Badland

This map unit is on low to high, smooth hills and on the tops of hills and sides of coulees. It is in the northwestern part of the county. Slope is 15 to 45 percent.

This unit makes up about 2.5 percent of the county. It is about 35 percent Neldore and similar soils, 25 percent Bascovy and similar soils, and about 20 percent Badland. The remaining 20 percent is soils of minor extent.

Neldore soils are shallow and generally are on upper slopes and tops of hills. The surface layer is dark gray clay. The underlying material is dark grayish brown clay over olive gray consolidated shale.

Bascovy soils are moderately deep and generally are on side slopes of hills and ridges. The soils are grayish brown silty clay over olive gray consolidated shale.

Badland generally consists of exposed consolidated shale on the tops of hills, along coulee edges, and in eroded spots.

Of minor extent in this unit are Sunburst soils on the tops of some hills and Yamac soils on fans and terraces.

This unit is used primarily as rangeland. It is very poorly suited to cultivated crops because of the areas of Badland, shallow depth to consolidated shale, and steepness of slope. This unit responds well to planned grazing systems and proper grazing use. It is very poorly suited to mechanical rangeland improvement practices.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Macar loam, 0 to 4 percent slopes, is one of several phases in the Macar series.

Some map units are made up of two or more major soils. These map units are called soil complexes or soil associations.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Bryant-Cambert complex, 2 to 8 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Yawdim-Badland-Gerdrum association is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Badland is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Detailed Map Unit Descriptions

1—Absher clay loam, 8 to 15 percent slopes. This deep, well drained, moderately salt-affected and strongly sodium-affected soil is on hillsides in the north-central and northeastern parts of the county. It formed in glacial till. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches in the north-central part of the county and about 14 inches in the northeastern part. The average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Hillon, Thoeny, Yawdim, and Zahill soils and shale outcroppings. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Absher soil, where mixed to a depth of 7 inches, has a surface layer of grayish brown clay loam. A thin, hard crust is on the surface. The subsoil is mostly light brownish gray clay loam and clay 20 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff

is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is moderately salt-affected and strongly sodium-affected at a depth of about 5 inches.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because of the high content of salts and sodium in the subsoil. The salts and sodium reduce the availability of moisture and some nutrients and restrict the movement of roots and moisture into the subsoil. The percentage of seedling emergence is reduced by the hard crust that forms on the soil surface as the soil dries following heavy rainfall. These characteristics drastically limit crop yields.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, Montana wheatgrass, winterfat, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, Sandberg bluegrass, perennial forbs, and fringed sagewort increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is poorly suited to windbreaks. It is salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by very slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. The soil is poorly suited to septic tank absorption fields because of very slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIe, nonirrigated. It is in Dense Clay range site, 10- to 14-inch precipitation zone.

2—Adger silty clay loam, 0 to 8 percent slopes. This deep, well drained, strongly salt- and sodium-affected soil is on fans, foot slopes, and terraces of glaciated uplands in the northeastern part of the county. It formed in alluvium. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Absher, Thoeny, Vida, Shambo, and Yawdim soils. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Adger soil, where mixed to a depth of 7 inches, has a surface layer of grayish brown silty clay loam. The subsoil is mostly light brownish gray silty clay loam 20 inches thick. The substratum to a depth of 60 inches or more is light brownish gray silt loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is strongly salt- and sodium-affected at a depth of about 9 inches.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because of the high content of salts and sodium in the subsoil, which reduces the availability of moisture and plant nutrients and restricts the penetration of roots and moisture into the subsoil. These characteristics drastically limit crop yields.

Rangeland.—The potential native plant community is mainly western wheatgrass, Montana wheatgrass, green needlegrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, Sandberg bluegrass, and other perennial short grasses increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

This soil is not suited to seeding because of the high content of sodium and salts. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as contour furrowing and scalping.

Windbreaks.—This soil is poorly suited to windbreaks. It is strongly salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable

depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIs, nonirrigated. It is in Clay Pan range site, 10- to 14-inch precipitation zone.

3—Adger-Absher complex, 0 to 8 percent slopes. This map unit is on fans, terraces, and foot slopes in the northeastern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Adger silty clay loam and 40 percent Absher clay loam. The Absher soil is in small depressional areas surrounded by the Adger soil.

Included in this unit are small areas of Thoeny, Yawdim, Vida, Shambo, and Weingart soils. Also included are small areas of deep, moderately well drained, strongly salt- and sodium-affected silty clay to clay. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Adger soil is deep, well drained, and strongly salt- and sodium-affected. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is grayish brown silty clay loam. The subsoil is mostly light brownish gray silty clay loam 20 inches thick. The substratum to a depth of 60 inches or more is light brownish gray silty clay loam and silt loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is strongly salt- and sodium-affected at a depth of about 9 inches.

The Absher soil is deep and well drained and is strongly salt-affected and moderately sodium-affected. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is grayish brown clay loam. A thin, hard crust is on the surface. The subsoil is mostly light brownish gray clay loam and clay 20 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 5 inches.

These soils are used as rangeland.

Cropland.—These soils are poorly suited to cultivated crops and hay because of the content of salts and sodium, which reduces the availability of moisture and plant nutrients and restricts the penetration of roots and moisture into the subsoil. These characteristics drastically limit crop yields.

Rangeland.—The potential native plant community on the Adger soil is mainly western wheatgrass, Montana wheatgrass, green needlegrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, Sandberg bluegrass, and other perennial short grasses increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Absher soil is mainly western wheatgrass, green needlegrass, Montana wheatgrass, winterfat, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, Sandberg bluegrass, other perennial short grasses, perennial forbs, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

These soils are poorly suited to seeding because of the high content of sodium and salts. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as contour furrowing and scalping.

Windbreaks.—These soils are poorly suited to windbreaks. They are salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by slow and very slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. These soils are poorly suited to septic tank absorption fields because of slow and very slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIs, nonirrigated. The Adger soil is in Clay Pan range site, 10-

to 14-inch precipitation zone, and the Absher soil is in Dense Clay range site, 10- to 14-inch precipitation zone.

4—Aeric Fluvaquents, loamy. These deep soils are on narrow flood plains in the northern part of the county. They formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Fleak, Sunburst, Havre, and Glendive soils. These areas do not adversely affect the use and management of this unit as rangeland.

Aeric Fluvaquents, loamy, are erratically stratified and do not have a typical profile. They range in texture from sandy loam to silty clay loam.

Permeability ranges from slow to moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. These soils have either a permanent or a seasonal high water table. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. These soils are subject to occasional periods of flooding during high intensity storms and during spring runoff.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the impracticability of effectively farming the small, odd-shaped areas that make up the unit.

Rangeland.—The potential native plant community on these soils has been altered by the entrenchment of a creek in the soils. It is now mainly little bluestem, green needlegrass, prairie sandreed, slender wheatgrass, and Canada wildrye. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of western wheatgrass, needleandthread, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, thistles, and Kentucky bluegrass may invade. The potential native plant community produces about 2,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 2,000 pounds in years of below-normal precipitation.

Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Use of mechanical treatment practices is not practical. To reduce competition of brush with desirable forage plants, control of silver sagebrush is a suitable practice on these soils. Forage yields can be increased by the use of water spreading on some of the larger areas.

Windbreaks.—These soils are poorly suited to windbreaks. It is difficult to select the most suitable trees and shrubs and to plant and maintain them because of the variability of the soils, the configuration of the areas of the unit, and the possible presence of a water table near the surface.

Homesite development.—These soils are poorly suited to homesite development because of the hazard of occasional flooding.

This map unit is in capability subclass VIIw, nonirrigated. It is in Overflow range site, 10- to 14-inch precipitation zone.

5—Alona silt loam, 0 to 8 percent slopes. This deep, well drained, moderately salt-affected and strongly sodium-affected soil is on fans, terraces, and terrace edges in the southwestern and eastern parts of the county. It formed in alluvium. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches in the southwestern part of the county and about 14 inches in the eastern part. The average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit in the eastern part of the county are small areas of Cherry soils; Macar loam, saline; Alona silt loam, saline; and Havrelon loam, saline, on the lower slopes and Cambert soils on the steeper slopes. In the southwestern part of the county are small areas of Lonna silt loam, saline, and Alona silt loam, saline, on the lower slopes and Cambeth soils on the steeper slopes. Also included are small areas of Alona silt loam on the steeper slopes. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Alona soil has a surface layer of grayish brown silt loam 5 inches thick. The subsoil is mostly light brownish gray to light gray silty clay loam 17 inches thick. The substratum to a depth of 60 inches or more is light gray silty clay loam.

Permeability is moderately slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is moderately salt-affected and strongly sodium-affected at a depth of about 12 inches.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because the high content of salts and sodium reduces the amount of moisture available to plants and restricts the penetration of roots and moisture into the subsoil. If the soil is cultivated, the percentage of seedling emergence is reduced by a hard crust that forms on the soil surface as the soil dries following rainfall or irrigation. These characteristics limit crop yields.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, alkali bluegrass, and Nuttall saltbush. If the range is

excessively grazed, the proportion of these plants decreases and the proportion of inland saltgrass, needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

This soil is not suited to seeding, but it is suited to mechanical treatment practices such as contour furrowing and scalping.

Windbreaks.—This soil is poorly suited to windbreaks. It is salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, shrink-swell potential, and low soil strength. Buildings can be designed to offset the effects of shrinking and swelling. If the soil is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIs, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

6—Alona silt loam, saline, 0 to 2 percent slopes. This deep, well drained, strongly salt- and sodium-affected soil is on low terraces along the major drainageways. It formed in alluvium. Slopes are mainly 250 feet to 1,000 feet in length. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches in the southwestern part of the county and about 14 inches in the eastern part. The average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit in the east-central part of the county are small areas of Cherry soils; Havrelon loam, saline; Bryant Variant silt loam; and Typic Fluvaquents, saline. In the west-central part of the county are small areas of Lonna and Havre soils and Typic Fluvaquents, saline. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Alona soil has a surface layer of grayish brown silt loam 5 inches thick. The subsoil is mostly light brownish gray silty clay loam 17 inches thick. The substratum to a depth of 60 inches or more is light gray silty clay loam.

Permeability is moderately slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is strongly salt- and sodium-affected at a depth of about 5 inches. It is subject to rare periods of flooding. It receives additional moisture as runoff from surrounding upland soils.

This soil is used as rangeland.

Cropland.—This soil is not suited to cultivated crops because the high content of salts and sodium reduces the availability of moisture and nutrients to the plants and restricts penetration of roots and moisture into the soil. If the soil is cultivated, the percentage of seedling emergence is drastically reduced by a hard crust that forms on the soil surface as the soil dries following rainfall or irrigation.

Rangeland.—The potential native plant community is mainly alkali cordgrass, alkali sacaton, Nuttall alkaligrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of inland saltgrass, western wheatgrass, and bottlebrush squirreltail increases. If excessive grazing continues, plants such as foxtail barley, annual saltbush, other annuals, and weedlike forbs may invade. The potential native plant community produces about 3,300 pounds per acre of air-dry vegetation in years of above-normal precipitation and 2,000 pounds in years of below-normal precipitation.

This soil is not suited to seeding because of the high content of sodium and salts. With increased grazing use, this soil may become more salty and thus produce less forage. Only the more salt-tolerant plant species can grow.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the high content of salts and sodium.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclass VIIs, nonirrigated. It is in Saline Lowland range site, 10- to 14-inch precipitation zone.

7—Badland. Badland consists mainly of steep and very steep, barren and nearly barren areas. These areas are nearly vertical escarpments, narrow ridges, isolated buttes, and deeply entrenched coulees and are mainly in the western and northern parts of the county. Badland was formed by active geologic erosion of weakly consolidated, silty and sandy sedimentary beds and of semiconsolidated and consolidated shale. Slope is 25 to 70 percent. Elevation is 1,900 to 3,000 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cabbart, Cabba, Fleak, Neldore, Benz, Gerdrum, and Vanda soils.

These included soils enhance the use and management of this unit for wildlife habitat, watershed, recreation, and very limited livestock grazing.

Runoff is very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is very high.

This unit is used mainly for wildlife habitat, watershed, recreation, and very limited rangeland. The included soils support grasses, forbs, and shrubs. Grazing is difficult to manage on these soils because of their limited acreage, remoteness of one area from another, and limited accessibility. Extreme care must be taken to prevent overgrazing and subsequent erosion.

Homesite development.—Steepness of slope limits this unit for homesite development.

This map unit is in capability subclass VIIIe, nonirrigated.

8—Banks fine sandy loam. This deep, excessively drained soil is on flood plains and low terraces along the Redwater River, Missouri River, and Sand Creek. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Trembles, Havrelon, and Ridgelawn soils. Also included are small areas of soils on short, steep slopes along terrace edges. These areas do not adversely affect the use and management of this unit as rangeland and for irrigated farming.

Typically, this Banks soil has a surface layer of pale brown fine sandy loam 5 inches thick. The upper 11 inches of the underlying material is pale brown fine sandy loam, and the lower part to a depth of 60 inches or more is light brownish gray loamy fine sand.

Permeability is rapid, and available water capacity is low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to rare periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks. This soil is droughty.

This soil is used as rangeland and for irrigated farming. The main irrigated crops are wheat, oats, barley, and alfalfa hay.

Cropland.—This soil is suited to irrigated crops. It is limited mainly by the hazard of soil blowing and the low available water capacity. In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Leveling is needed in sloping areas for the efficient application and removal of irrigation water. Because this soil is droughty, light and frequent applications of irrigation water are needed. Keeping a cover crop of grasses and legumes on the soil during the nonirrigation season reduces soil blowing.

Rangeland.—The potential native plant community is mainly sand bluestem, prairie sandreed, Indian ricegrass, little bluestem, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, sand dropseed, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Range seeding of native plants is a suitable practice to prevent excessive soil erosion and to convert land back to rangeland from other uses. Special precautions may be needed to reduce the risks of soil blowing and flooding until the plant cover is reestablished.

Windbreaks.—This soil is suited to windbreaks. The low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses VIe, nonirrigated, and IVe, irrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

9—Barkof silty clay, 2 to 8 percent slopes. This moderately deep, well drained soil is on foot slopes and side slopes of knolls and low hills in the eastern part of the county. It formed in material derived from semiconsolidated shale. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cabba, Dast, and Bryant soils. The Cabba and Dast soils are highly susceptible to soil blowing. The Bryant soil does not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Barkof soil, where mixed to a depth of 7 inches, has a surface layer of grayish brown silty clay. The subsoil is mostly light brownish gray silty clay 19 inches thick. The substratum to a depth of 29 inches is light gray silty clay. Below this to a depth of 60 inches or more is mainly white semiconsolidated shale. Semiconsolidated shale is at a depth of 20 to 40 inches.

Permeability is slow, and available water capacity is low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 20 to 40 inches.

Where this soil is under native vegetation, the average annual wetting depth is 20 to 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is droughty.

This soil is used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the moderate hazards of water erosion and soil blowing, low available water capacity, and the clayey surface layer. The soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. The surface layer of this soil is high in content of lime and low in content of organic matter. Crops respond well to the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, low soil strength, potential for shrinking and swelling, and moderate depth to semiconsolidated shale. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. This soil is poorly suited to septic tank absorption fields because of slow permeability and depth to semiconsolidated shale. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIs, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

10—Bascovy silty clay, 2 to 8 percent slopes. This moderately deep, well drained soil is on knolls and foot slopes in the northwestern part of the county. It formed in material derived from consolidated shale. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Neldore, Vanda, and Sunburst soils and shale outcroppings. Also included are small areas of soils that have slopes of more than 8 percent. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Bascovy soil has a surface layer of grayish brown silty clay 2 inches thick. The subsoil is grayish brown silty clay 9 inches thick. The substratum to a depth of 23 inches is grayish brown silty clay. Below this to a depth of 60 inches or more is olive gray consolidated shale. Consolidated shale is at a depth of 20 to 40 inches.

Permeability is very slow, and available water capacity is low. Effective rooting depth is limited by the consolidated shale at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high. The hazard of soil blowing is moderate. This soil is droughty.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because of its low available water capacity and moderate depth to shale, which limits root penetration.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling, scalping, and contour furrowing.

Windbreaks.—This soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by very slow permeability, moderate depth to consolidated shale, low soil strength, and shrink-swell potential. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from the buildings help to prevent structural damage as a result of shrinking and swelling. This soil is poorly suited to septic tank absorption fields because of very slow permeability and moderate depth to consolidated shale. Access roads must be designed to control surface runoff and help stabilize cut slopes. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVs, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

11—Bascovy-Sunburst complex, 15 to 45 percent slopes. This map unit is on uplands in the northwestern part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Bascovy silty clay and about 40 percent Sunburst clay loam. The moderately steep Bascovy soil is on lower side slopes, and the moderately steep to steep Sunburst soil is on upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Neldore and Vanda soils and shale outcroppings. Also included are small areas of less sloping Bascovy and Sunburst soils. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Bascovy soil is moderately deep and well drained. It formed in material derived from consolidated shale. Typically, the surface layer is grayish brown silty clay 2 inches thick. The subsoil is grayish brown silty clay 9 inches thick. The substratum to a depth of 23 inches is grayish brown silty clay. Below this, to a depth of 62 inches or more, is olive gray to gray consolidated shale. Consolidated shale is at a depth of 20 to 40 inches.

Permeability is very slow, and available water capacity is low. Effective rooting depth is limited by consolidated shale at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate. Consolidated shale is at a depth of 20 to 40 inches. This soil is droughty.

The Sunburst soil is deep and well drained. It formed in glacial till. Typically, the surface layer is grayish brown clay loam 3 inches thick. The upper 16 inches of the underlying material is grayish brown silty clay loam, and the lower part to a depth of 60 inches or more is mostly grayish brown silty clay.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 16 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Bascovy soil is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of perennial short grasses, juniper, perennial forbs, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,300 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

The potential native plant community on the Sunburst soil is mainly little bluestem, bluebunch wheatgrass, green needlegrass, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of native perennial short grasses, threadleaf sedge, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Use of mechanical treatment practices is not practical. These soils are not suited to rangeland seeding because of the steepness of slope.

Windbreaks.—These soils are not suited to windbreaks. They are limited mainly by steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of

slope and the moderate depth to consolidated shale in the Bascovy soil.

This map unit is in capability subclass VIIe, nonirrigated. It is in Thin Clayey range site, 10- to 14-inch precipitation zone.

12—Benz clay loam, 0 to 8 percent slopes. This deep, well drained, strongly salt- and sodium-affected soil is on fans and terraces below sandstone and shale hills in the northern part of the county. It formed in alluvium. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Rominell, Yawdim, Weingart, and Fleak soils. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Benz soil, where mixed to a depth of 7 inches, has a surface layer of grayish brown clay loam. The underlying material to a depth of 60 inches or more is grayish brown clay loam stratified with thin lenses of fine sandy loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is strongly salt- and sodium-affected at a depth of about 1 inch.

This soil is used as rangeland.

Cropland.—This soil is not suited to nonirrigated crops because the high content of salts and sodium in the surface layer substantially limits crop yields.

Rangeland.—The potential native plant community is mainly western wheatgrass, Montana wheatgrass, alkali sacaton, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of inland saltgrass, Sandberg bluegrass, bottlebrush squirreltail, perennial forbs, and low sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 500 pounds per acre of air-dry vegetation in years of above-normal precipitation and 200 pounds in years of below-normal precipitation.

This soil is not suited to rangeland seeding or mechanical treatment practices because of the high content of sodium and salts.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the high content of salts and sodium.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIIe, nonirrigated. It is in Saline Upland range site, 10- to 14-inch precipitation zone.

13—Bowbells loam. This deep, well drained soil is in broad, nearly level areas in basins and swales in the northeastern part of the county. It formed in glacial till and local alluvium. Slope is 0 to 2 percent. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Williams and Vida soils. These areas do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Bowbells soil has a surface layer of dark grayish brown loam 10 inches thick. The upper 18 inches of the subsoil is dark grayish brown loam and clay loam, and the lower 9 inches is light brownish gray loam. The substratum to a depth of 60 inches or more is grayish brown and light gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

Most areas of this soil are used for nonirrigated farming. A few areas are used as rangeland. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated crops. It has few limitations. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control soil blowing. Areas of this soil in the Wolf Creek drainageway and north of Montana Highway 201 have potential for the formation of saline seeps. Suitable practices for reducing the development of saline seeps are using flexible cropping systems, seeding legumes in recharge areas, and providing surface and subsurface drainage where needed.

Rangeland.—The potential native plant community is mainly big bluestem, little bluestem, green needlegrass, and western wheatgrass. If the range is excessively

grazed, the proportion of big bluestem, little bluestem, and green needlegrass decreases and the proportion of western wheatgrass, needleandthread, silver sagebrush, and rose increases. If excessive grazing continues, plants such as annuals, thistles, Kentucky bluegrass, and other weedlike forbs may invade. The potential native plant community produces about 2,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,600 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as scalping and chiseling.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Overflow range site, 10- to 14-inch precipitation zone.

14—Bryant silt loam, 0 to 4 percent slopes. This deep, well drained soil is on fans and terraces in the east-central and southeastern parts of the county. It formed in local alluvium derived from weakly consolidated, silty sedimentary beds. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambert, Cherry, Shambo, and Farland soils. The Cherry soils are on fans and terraces. They are highly susceptible to soil blowing. The Cambert soils are on foot slopes. They are underlain by root-limiting, weakly consolidated, silty sedimentary beds at a depth of 20 to 40 inches. The Shambo and Farland soils do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Bryant soil has a surface layer of dark grayish brown silt loam 4 inches thick. The upper 10 inches of the subsoil is dark grayish brown and grayish brown silt loam, and the lower 10 inches is light brownish gray silty clay loam. The substratum to a depth of 60 inches or more is mostly light gray silty clay loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

This soil is used mainly for nonirrigated farming. It is also used as rangeland. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and silver sagebrush increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by low soil

strength, shrink-swell potential, and moderate permeability. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

15—Bryant silt loam, 4 to 8 percent slopes. This deep, well drained soil is on fans and foot slopes in the southeastern and east-central parts of the county. It formed in local alluvium derived from weakly consolidated, silty sedimentary beds. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambert, Cherry, and Shambo soils. The Cherry soils are on fans and are highly susceptible to soil blowing. The Cambert soils are on the sides and tops of low hills. They are underlain by root-limiting, weakly consolidated, silty sedimentary beds at a depth of 20 to 40 inches. The Shambo soils do not adversely affect the use and management of this unit for nonirrigated farming or as rangeland.

Typically, this Bryant soil has a surface layer of dark grayish brown silt loam 4 inches thick. The upper 10 inches of the subsoil is dark grayish brown and grayish brown silt loam, and the lower 10 inches is light brownish gray silty clay loam. The substratum to a depth of 60 inches or more is mostly light gray silty clay loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

This soil is used mainly for nonirrigated farming. It is also used as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and silver sagebrush increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by low soil strength, shrink-swell potential, and moderate permeability. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

16—Bryant-Cambert complex, 2 to 8 percent slopes. This map unit is on uplands in the east-central and southeastern parts of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Bryant silt loam and 40 percent Cambert loam. The gently sloping Bryant soil is on the lower side slopes, on foot slopes, and in swales. The gently sloping to moderately sloping Cambert soil is on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Shambo, Cabba, Dast, and Macar soils. Included areas make up about 15 percent of the total acreage. The shallow Cabba soils are on the tops of low hills. They are underlain by root-limiting, weakly consolidated, silty sedimentary beds at a depth of 10 to 20 inches and are highly susceptible to soil blowing. The Dast and Macar soils are highly susceptible to soil blowing. The Shambo soils do not adversely affect the use and management of this unit for nonirrigated farming or as rangeland.

The Bryant soil is deep and well drained. It formed in local alluvium derived from weakly consolidated, silty sedimentary beds. Typically, the surface layer is dark grayish brown silt loam 4 inches thick. The upper 10 inches of the subsoil is dark grayish brown and grayish brown silt loam, and the lower 10 inches is light brownish gray silty clay loam. The substratum to a depth of 60 inches or more is mostly light gray silty clay loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

The Cambert soil is moderately deep and well drained. It formed in material derived from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown loam 4 inches thick. The subsoil is mostly brown loam 9 inches thick. The substratum to a depth of 26 inches is very pale brown silty clay loam. Below this to a depth of 60 inches or more is pale yellow and light gray weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

These soils are used for nonirrigated farming or as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are well suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, red threeawn, and Kentucky bluegrass may invade. The potential native plant community on the Bryant soil produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation. The potential native plant community on the Cambert soil produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—The Bryant soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Cambert soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Bryant soil is limited mainly by low soil strength, shrink-swell potential, and moderate permeability. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Cambert soil is limited mainly by low soil strength and slow permeability of the underlying sedimentary beds. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying

sedimentary beds. Deep cuts needed to provide nearly level road surfaces can expose sedimentary beds that can easily be excavated. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

17—Bryant Variant silt loam, 0 to 2 percent slopes. This deep, moderately well drained, strongly salt-affected and moderately sodium-affected soil is on terraces in the east-central and northeastern parts of the county. It formed in alluvium. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Alona silt loam; Alona silt loam, saline; Havrelon soils, saline; and Bryant soils. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Bryant Variant soil has a surface layer of dark grayish brown silt loam 10 inches thick. The upper 5 inches of the subsoil is grayish brown silt loam, and the lower 9 inches is light brownish gray silty clay loam. The upper 9 inches of the substratum is light brownish gray silt loam, and the lower part to a depth of 60 inches or more is light gray silty clay loam.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected from the soil surface to a depth of 40 inches.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because the high content of salts reduces the availability of moisture and nutrients to plants. If this soil is cultivated, the percentage of seedling emergence is reduced by the hard crust that forms on the soil surface as the soil dries following rainfall or irrigation. These characteristics drastically limit crop yields.

Rangeland.—The potential native plant community is mainly alkali cordgrass, alkali sacaton, Nuttall alkaligrass, Nuttall saltbush, tall sedges, and alkali bluegrass. If the range is excessively grazed, the proportion of these plants decreases and the proportion of western wheatgrass, inland saltgrass, and bottlebrush squirreltail increases. If excessive grazing continues, plants such as foxtail barley, annual saltbush, and other annuals and weedlike forbs may invade. The potential native plant community produces about 3,300 pounds per acre of air-dry vegetation in years of above-normal precipitation and 2,000 pounds in years of below-normal precipitation.

Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. With increased grazing use, this soil may become more salty and thus produce less forage. Only the more salt-tolerant plants will grow. This soil is not suited to rangeland seeding or mechanical treatment practices because of the high content of salts in the soil.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the high content of salts.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by low soil strength, shrink-swell potential, moderate permeability, and wetness. Wetness can be reduced by installing drain tile around footings. The soil is poorly suited to septic tank absorption fields because of wetness. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIIs, nonirrigated. It is in Saline Lowland range site, 10- to 14-inch precipitation zone.

18—Busby fine sandy loam, 2 to 8 percent slopes. This deep, well drained soil is on fans and foot slopes in the western part of the county. It formed in alluvium. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Twilight, Cambeth, Yetull, and Yamac soils. The moderately deep Twilight and Cambeth soils are on upper side slopes and on tops of low hills. They are droughty and are lower in productivity than this Busby soil. The deep Yetull soils are in swales and in areas protected from the prevailing winds. They are droughty and are low in productivity. The Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Busby soil has a surface layer of grayish brown fine sandy loam 5 inches thick. The subsoil is light olive brown fine sandy loam 6 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the high hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. Tall grass barriers also trap snow, which increases the amount of moisture in the soil.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

19—Busby fine sandy loam, 8 to 15 percent slopes. This deep, well drained soil is on fans and side slopes of hills in the western part of the county. It formed in alluvium. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Fleak, Cabbart, Yawdim, and Yetull soils. The shallow Fleak, Cabbart, and Yawdim soils and the deep Yetull soils are droughty and are low in productivity.

Typically, this Busby soil has a surface layer of grayish brown fine sandy loam 5 inches thick. The subsoil is light olive brown fine sandy loam 6 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 28 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

Most areas of this soil are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is well suited to homesite development. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass IVe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

20—Busby-Fleak complex, 15 to 45 percent slopes. This map unit is on uplands, mostly in the west-central and northwestern parts of the county. Slopes are mainly

less than 2,500 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Busby fine sandy loam and about 40 percent Fleak loamy sand. The moderately steep Busby soil is on fans and side slopes, and the moderately steep to steep Fleak soil is on the tops of ridges and hills.

Included in this unit are small areas of Yamac and Sunburst soils and small areas of sandstone and shale outcroppings. Also included are small areas of soils that have slopes of more than 45 percent. Included areas make up about 20 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Busby soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown fine sandy loam 5 inches thick. The subsoil is light olive brown fine sandy loam 6 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 28 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Fleak soil is shallow and somewhat excessively drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer, where mixed to a depth of 7 inches, is olive brown loamy sand. The underlying material to a depth of 16 inches is olive loamy sand. Below this to a depth of 60 inches or more are mostly light olive brown, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Busby soil is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The potential native plant community on the Fleak soil is mainly prairie sandreed, little bluestem, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, yucca, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Use of mechanical treatment practices is not practical.

Windbreaks.—These soils are not suited to windbreaks because of the steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Busby soil is in Sandy range site, 10- to 14-inch precipitation zone, and the Fleak soil is in Shallow range site, 10- to 14-inch precipitation zone.

21—Busby-Twilight fine sandy loams, 2 to 8 percent slopes. This map unit is on uplands in the western part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 55 percent Busby fine sandy loam and about 30 percent Twilight fine sandy loam. The Busby soil is on fans and foot slopes and in swales, and the Twilight soil is on the side slopes and tops of hills and knolls.

Included in this unit are small areas of Cabbart, Fleak, Chinook, and Rominell soils. Included areas make up about 15 percent of the total acreage. The shallow, well drained Cabbart and Fleak soils are on the upper side slopes and tops of ridges and hills. They are droughty and low in productivity. The deep, salt- and sodium-affected Rominell soils are on the lower foot slopes and fans. The high content of salts in these soils reduces the moisture available for plants, and the high content of sodium in the subsoil restricts penetration by roots and moisture. These characteristics limit crop yields. The Chinook soils do not adversely affect the use and management of this unit as rangeland or for nonirrigated farming.

The Busby soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown fine sandy loam 5 inches thick. The subsoil is light olive brown fine sandy loam 6 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

The Twilight soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 5 inches thick. The upper 5 inches of the subsoil is brown fine sandy loam, and the lower 6 inches is pale brown fine sandy loam. The substratum to a depth of 25 inches is light brownish gray sandy loam. Below this to a depth of 60 inches or more are light brownish gray, weakly consolidated sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is droughty.

Most areas of these soils are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the high hazard of soil blowing and by the droughtiness of the Twilight soil. Because of the droughtiness, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce soil blowing.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community on both soils produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation. In years of below-normal precipitation, the potential native plant community produces about 1,200 pounds of air-dry vegetation on the Busby soil and 1,000 pounds on the Twilight soil.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—The Busby soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Twilight soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are well suited to homesite development. They have few limitations. In places, excavation for roads can expose material that is susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

22—Busby-Twilight-Fleak complex, 8 to 15 percent slopes. This map unit is on uplands in the western part of the county. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Busby fine sandy loam, 30 percent Twilight fine sandy loam, and 20 percent Fleak loamy sand. The Busby soil is in swales and on fans and lower side slopes, the Twilight soil is on side slopes, and the Fleak soil is on the tops of hills and ridges.

Included in this unit are small areas of Cabbart, Yamac, and Rominell soils and small areas of sandstone and shale outcroppings. Included areas make up about 10 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Busby soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown fine sandy loam 5 inches thick. The subsoil is light olive brown fine sandy loam 6 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is medium, and the hazard of water

erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

The Twilight soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 5 inches thick. The upper 5 inches of the subsoil is brown fine sandy loam, and the lower 6 inches is pale brown fine sandy loam. The substratum to a depth of 25 inches is light brownish gray sandy loam. Below this to a depth of 60 inches or more are light brownish gray, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is droughty.

The Fleak soil is shallow and somewhat excessively drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically the surface layer, where mixed to a depth of 7 inches, is olive brown loamy sand. The underlying material to a depth of 16 inches is olive loamy sand. Below this to a depth of 60 inches or more are mostly light olive brown, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is droughty.

These soils are used as rangeland.

Cropland.—The Twilight and Fleak soils are poorly suited to cultivated crops because they are droughty and thus are low in productivity.

Rangeland.—The potential native plant community on the Busby and Twilight soils is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community on both soils produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation. In years of below-normal precipitation, the potential native plant community produces about 1,200 pounds per acre of air-dry vegetation on the Busby soil and about 1,000 pounds on the Twilight soil.

The potential native plant community on the Fleak soil is mainly prairie sandreed, little bluestem, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, yucca, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The Fleak soil is not suited to practices such as seeding, shallow chiseling, and scalping because it is extremely droughty and is more susceptible to soil blowing and water erosion if it is disturbed. Reestablishing plant cover is difficult. The surface layer of the Busby and Twilight soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. These soils are suited to seeding and mechanical treatment practices. All tillage should be on the contour or across the slope.

Windbreaks.—The Busby soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Twilight soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

The Fleak soil is not suited to windbreaks. It is limited mainly by the very low available water capacity.

Homesite development.—These soils are suited to homesite development. They have few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe, nonirrigated. The Busby and Twilight soils are in Sandy range site, 10- to 14-inch precipitation zone, and the Fleak soil is in Shallow range site, 10- to 14-inch precipitation zone.

23—Busby-Yamac-Fleak complex, 15 to 45 percent slopes. This map unit is on uplands, mostly in the west-central and northwestern parts of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 35 percent Busby fine sandy loam, 30 percent Yamac loam, and 25 percent Fleak loamy sand. The moderately steep Busby and Yamac soils are on side slopes and fans, and the moderately steep to steep Fleak soil is on the tops of hills and ridges.

Included in this unit are small areas of Kremlin, Yetull, Sunburst, and Hillon soils and small areas of sandstone outcroppings. Also included are small areas of soils that have slopes of less than 15 percent. Included areas make up about 10 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Busby soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown fine sandy loam 5 inches thick. The subsoil is light olive brown fine sandy loam 6 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Yamac soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 21 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Fleak soil is shallow and somewhat excessively drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer, where mixed to a depth of 7 inches, is olive brown loamy sand. The underlying material to a depth of 16 inches is mostly olive loamy sand. Below this to a depth of 60 inches or more are mostly light olive brown, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. The soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of steepness of slope.

Rangeland.—The potential native plant community on the Busby soil is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Yamac soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

The potential native plant community on the Fleak soil is mainly prairie sandreed, little bluestem, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, yucca, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Use of mechanical treatment practices is not practical. These soils are not suited to rangeland seeding because of the steepness of slope.

Windbreaks.—These soils are not suited to windbreaks because of the steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Busby soil is in Sandy range site, 10- to 14-inch precipitation zone; the Yamac soil is in Thin Silty range site, 10- to 14-inch precipitation zone; and the Fleak soil is in Shallow range site, 10- to 14-inch precipitation zone.

24—Busby-Yetull fine sandy loams, 2 to 8 percent slopes. This map unit is on uplands in the western part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Busby fine sandy loam and about 40 percent Yetull fine sandy loam. The Busby soil is on fans, foot slopes, and side slopes, and the Yetull soil is on fans and foot slopes and in areas that are protected from the prevailing wind.

Included in this unit are small areas of Twilight, Chinook, and Cabbart soils. Included areas make up about 10 percent of the total acreage. The moderately deep Twilight soils and the shallow Cabbart soils are on the upper side slopes and on the tops of hills. They are droughty and are low in productivity. The Chinook soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Busby soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown fine sandy loam 5 inches thick. The subsoil is light olive brown fine sandy loam 6 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

The Yetull soil is deep and somewhat excessively drained. It formed in sandy alluvial and eolian material. Typically, the surface layer is light brownish gray fine sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loamy sand.

Permeability is rapid, and available water capacity is low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is droughty.

Most areas of these soils are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are poorly suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion and by the droughtiness of the Yetull soil. Because of droughtiness, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce soil blowing and water erosion.

Rangeland.—The potential native plant community on the Busby soil is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The potential native plant community on the Yetull soil is mainly sand bluestem, prairie sandreed, Indian ricegrass, little bluestem, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, sand dropseed, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling.

Windbreaks.—The Busby soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Yetull soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are well suited to homesite development. They have few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Because the Yetull soil is rapidly permeable, effluent from septic tank absorption fields may contaminate ground water.

This map unit is in capability subclass IVe, nonirrigated. The Busby soil is in Sandy range site, 10 to 14-inch precipitation zone, and the Yetull soil is in Sands range site, 10 to 14-inch precipitation zone.

25—Cabba loam, 15 to 25 percent slopes. This shallow, well drained soil is on the sides and tops of hills and ridges in the eastern part of the county. It formed in

material derived from weakly consolidated, sandy and silty sedimentary beds. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Barkof, Dast, and Macar soils. Also included are small areas of sandstone and siltstone outcroppings. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Cabba soil has a surface layer of light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. The soil is calcareous throughout. It is droughty.

This soil is used as rangeland.

Cropland.—This soil is very poorly suited to cultivated crops because of steepness of slope and the very low available water capacity.

Rangeland.—The potential native plant community is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Limited use of mechanical treatment practices such as contour furrowing and scalping can improve deteriorated areas of rangeland.

Windbreaks.—This soil is poorly suited to windbreaks. It is limited mainly by the very low available water capacity and the steepness of slope.

Homesite development.—This soil is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIe, nonirrigated. It is in Shallow range site, 10- to 14-inch precipitation zone.

26—Cabba-Badland complex, 15 to 45 percent slopes. This map unit is on uplands in the eastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 35 percent Cabba loam and 35 percent Badland. The Cabba soil is on the sides and tops of hills and ridges, and Badland consists of deeply entrenched coulees, escarpments, and terrace edges.

Included in this unit are small areas of Dast, Brandenburg, Macar, and Zahill soils. Included areas make up about 30 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

Badland consists mainly of steep to very steep, barren and nearly barren escarpments, narrow ridges, and deeply entrenched coulees. It was formed by active geologic erosion of weakly consolidated, sandy and silty sedimentary beds and semiconsolidated shale.

Runoff is rapid or very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is high.

This unit is used as rangeland.

Cropland.—This unit is not suited to cultivated crops because of steepness of slope and the areas of Badland.

Rangeland.—The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited. Use of mechanical treatment practices is not practical.

Windbreaks.—This unit is not suited to windbreaks because of the steepness of slope and the areas of Badland.

Homesite development.—This unit is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone.

27—Cabba-Barkof complex, 15 to 45 percent slopes. This map unit is on hills and ridges in the east-central and southeastern parts of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Cabba loam and 35 percent Barkof silty clay.

Included in this unit are small areas of Dast and Cambert soils and shale outcroppings. Included areas make up about 20 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

The Barkof soil is moderately deep and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer, where mixed to a depth of 7 inches, is grayish brown silty clay. The subsoil is mostly light brownish gray silty clay 19 inches thick. The substratum to a depth of 29 inches is light gray silty clay. Below this to a depth of 60 inches or more is mainly white semiconsolidated shale. Semiconsolidated shale is at a depth of 20 to 40 inches.

Permeability is slow, and available water capacity is low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 24 inches. Runoff is very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Barkof soil is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of perennial short grasses, perennial forbs, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,300 pounds of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Use of mechanical treatment practices is not practical.

Windbreaks.—These soils are not suited to windbreaks. They are limited mainly by the steepness of slope and the low and very low available water capacity.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone, and the Barkof soil is in Thin Clayey range site, 10- to 14-inch precipitation zone.

28—Cabba-Brandenburg complex, 8 to 45 percent slopes. This map unit is on uplands, mostly in the southeastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Cabba loam and 35 percent Brandenburg channery loam. The strongly sloping to moderately steep Cabba soil is on the sides of hills and ridges, and the strongly sloping to steep Brandenburg soil is on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Dast, Barkof, and Cambert soils. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

The Brandenburg soil is deep and excessively drained. It formed in material derived from shattered porcellanite. Typically, the surface layer is brown channery loam 5 inches thick. The underlying material to a depth of 10 inches is brown very channery loam. Below this to a depth of 60 inches or more is reddish yellow, shattered porcellanite. Shattered porcellanite is at a depth of 10 to 20 inches.

Permeability is moderate to a depth of 10 inches and very rapid below this depth. Available water capacity is very low. Effective rooting depth is limited by the shattered porcellanite at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is about 48 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of droughtiness and steepness of slope.

Rangeland.—The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, sideoats grama, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and sideoats grama decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Brandenburg soil is mainly prairie sandreed, bluebunch wheatgrass, little bluestem, thickspike wheatgrass, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, blue grama, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 725 pounds per acre of air-dry vegetation in years of above-normal precipitation and 425 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Use of mechanical treatment practices is not practical.

Windbreaks.—These soils are poorly suited to windbreaks. They are limited mainly by very low available water capacity.

Homesite development.—Areas of the Cabba soil that have slopes of more than 15 percent are poorly suited to homesite development. Where slopes are less than 15 percent, however, the soil is suited to homesite development. It is limited mainly by low soil strength and the slow permeability of the underlying sedimentary beds. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

The Brandenburg soil is poorly suited to homesite development because of the steepness of slope and the shattered porcellanite below a depth of 10 to 20 inches. If crushed to gravel-sized fragments, the underlying material of the Brandenburg soil can be used in building and surfacing roads.

This map unit is in capability subclass VIIe, nonirrigated. The Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone, and the Brandenburg soil is in Very Shallow range site, 10- to 14-inch precipitation zone.

29—Cabba-Dast complex, 15 to 45 percent slopes. This map unit is on the sides and tops of hills and ridges in the east-central and southeastern parts of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Cabba loam and 40 percent Dast fine sandy loam.

Included in this unit are small areas of Barkof, Macar, and Lisk soils and small areas of sandstone outcroppings. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

The Dast soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 3 inches thick. The underlying material to a depth of 25 inches is light gray and very pale brown fine sandy loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 32 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Dast soil is mainly prairie sandreed, little bluestem, plains muhly, sideoats grama, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, green sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Use of mechanical treatment practices is not practical.

Windbreaks.—These soils are not suited to windbreaks. They are limited mainly by the steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone, and the Dast soil is in Thin Sandy range site, 10 to 14-inch precipitation zone.

30—Cabba-Wabek-Dast complex, 15 to 45 percent slopes. This map unit is on hills and ridges in the southeastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,500 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 35 percent Cabba loam, 25 percent Wabek sandy loam, and 25 percent Dast fine sandy loam. The moderately steep to steep Cabba and Dast soils are on the sides and foot slopes of hills and ridges, and the moderately steep Wabek soil is on the tops of hills and ridges.

Included in this unit are small areas of Shambo and Cambert soils. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the

hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

The Wabek soil is deep and excessively drained. It formed in sandy and gravelly outwash deposits. Typically, the surface layer is grayish brown sandy loam 7 inches thick. The underlying material to a depth of 60 inches or more is light gray very gravelly sand. Very gravelly sand is at a depth of 7 to 15 inches.

Permeability is very rapid, and available water capacity is very low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 34 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous below a depth of 7 inches. It is very droughty.

The Dast soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 3 inches thick. The underlying material to a depth of 25 inches is light gray and very pale brown fine sandy loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of steepness of slope.

Rangeland.—The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and sideoats grama. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Wabek soil is mainly bluebunch wheatgrass, plains muhly, little bluestem, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, plains muhly, and little bluestem decreases and the proportion of needleandthread, threadleaf sedge, blue grama, green sagewort, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 700 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

The potential native plant community on the Dast soil is mainly prairie sandreed, little bluestem, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, green sagewort, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Use of mechanical treatment practices is not practical.

Windbreaks.—These soils are not suited to windbreaks. They are limited mainly by steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope. The Wabek soil is a source of gravel for building and surfacing roads.

This map unit is in capability subclass VIIe, nonirrigated. The Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone, the Wabek soil is in Gravel range site, 10- to 14-inch precipitation zone; and the Dast soil is in Thin Sandy range site, 10- to 14-inch precipitation zone.

31—Cabbart silt loam, 15 to 25 percent slopes. This shallow, well drained soil is on the sides and tops of hills and ridges in the west-central and southwestern parts of the county. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Yawdim, Busby, Yamac, and Fleak soils and areas of sandstone and siltstone outcroppings. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Cabbart soil has a surface layer of grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

This soil is used as rangeland.

Cropland.—This soil is not suited to cultivated crops because of steepness of slope and droughtiness.

Rangeland.—The potential native plant community is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Use of mechanical treatment practices is not practical. The soil is not suited to practices such as seeding because it is droughty and is susceptible to soil blowing and water erosion if it is disturbed.

Windbreaks.—This soil is not suited to windbreaks because of the very low available water capacity and the steepness of slope.

Homesite development.—This soil is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. It is in Shallow range site, 10- to 14-inch precipitation zone.

32—Cabbart-Badland complex, 15 to 45 percent slopes. This map unit is on uplands in the west-central and southwestern parts of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 35 percent Cabbart silt loam and about 35 percent Badland. The moderately steep to steep Cabbart soil is on the upper side slopes and tops of hills and ridges. The steep to very steep areas of Badland are narrow ridges, deep coulees, and escarpments.

Included in this unit are small areas of Kirby, Busby, Yamac, Gerdrum, and Yawdim soils and soils that have slopes of less than 15 percent. Included areas make up about 30 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabbart soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

Badland consists mainly of steep to very steep, barren and nearly barren escarpments, narrow ridges, and deeply entrenched coulees. It was formed by active geologic erosion of weakly consolidated, sandy and silty sedimentary beds and semiconsolidated shale. Runoff is rapid to very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is high.

This unit is used as rangeland.

Cropland.—This unit is not suited to cultivated crops because of steepness of slope and the large areas of Badland.

Rangeland.—The potential native plant community on the Cabbart soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

Windbreaks.—This unit is not suited to windbreaks. It is limited mainly by the very low available water capacity and the steepness of slope.

Homesite development.—This unit is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Cabbart soil is in Shallow range site, 10- to 14-inch precipitation zone.

33—Cabbart-Kirby complex, 8 to 45 percent slopes. This map unit is on uplands, mainly in the southwestern part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Cabbart silt loam and 35 percent Kirby very channery loam. The strongly sloping to moderately steep Cabbart soil is on the side slopes of hills and ridges, and the strongly sloping to steep Kirby soil is on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Gerdrum, Alona, Yamac, and Yawdim soils. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabbart soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

The Kirby soil is deep and well drained. It formed in material derived from sandstone and shale. Typically, the surface layer is light brown very channery loam 5 inches thick. The upper 13 inches of the underlying material is mainly light brown very channery loam, and the lower part to a depth of 60 inches or more is light brown sandstone and shale fragments. Sandstone and shale fragments are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by sandstone and shale fragments at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is very droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the droughtiness and steepness of slope.

Rangeland.—The potential native plant community on the Cabbart soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Kirby soil is mainly bluebunch wheatgrass, little bluestem, sideoats grama, plains muhly, and thickspike wheatgrass. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, skunkbush sumac, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 700 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

Windbreaks.—These soils are not suited to windbreaks because of the very low available water capacity and the steepness of slope.

Homesite development.—Where slopes are more than 15 percent, the Cabbart soil is poorly suited to homesite development. Where slopes are less than 15 percent, however, the soil is suited to homesite development. It is limited mainly by low soil strength and the slow permeability of the underlying sedimentary beds. The soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

The Kirby soil is poorly suited to homesite development because of the steepness of slope and the high content of sandstone and shale fragments below a depth of 10 to 20 inches. When crushed to gravel-sized fragments, the underlying material of the Kirby soil is suitable for use in building and surfacing roads.

This map unit is in capability subclass VIIe, nonirrigated. The Cabbart soil is in Shallow range site, 10- to 14-inch precipitation zone, and the Kirby soil is in Very Shallow range site, 10- to 14-inch precipitation zone.

34—Cabbart-Twilight complex, 15 to 45 percent slopes. This map unit is on the sides and tops of hills and ridges in the western part of the county. Slopes are

mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Cabbart silt loam that has slopes of 15 to 45 percent and about 35 percent Twilight fine sandy loam that has slopes of 15 to 25 percent.

Included in this unit are small areas of Fleak, Yawdim, Busby, and Yamac soils and Rock outcrop. Included areas make up about 25 percent of the total acreage. These soils do not adversely affect the use and management of this unit as rangeland. The areas of Rock outcrop limit the range production of the unit.

The Cabbart soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. This soil is calcareous throughout. It is droughty.

The Twilight soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 5 inches thick. The upper 5 inches of the subsoil is brown fine sandy loam, and the lower 6 inches is pale brown fine sandy loam. The substratum to a depth of 25 inches is light brownish gray sandy loam. Below this to a depth of 60 inches or more are light brownish gray, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the droughtiness and steepness of slope.

Rangeland.—The potential native plant community on the Cabbart soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Twilight soil is mainly prairie sandreed, little bluestem, plains muhly, and sideoats grama. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, green sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Use of mechanical treatment practices is not practical. These soils are not suited to seeding because of the steepness of slope.

Windbreaks.—These soils are not suited to windbreaks because of the very low and low available water capacity and steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Cabbart soil is in Shallow range site, 10- to 14-inch precipitation zone, and the Twilight soil is in Thin Sandy range site, 10- to 14-inch precipitation zone.

35—Cabbart-Yawdim complex, 4 to 15 percent slopes. This map unit is on the sides and tops of hills and ridges in the west-central part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 55 percent Cabbart silt loam and 35 percent Yawdim silty clay.

Included in this unit are small areas of Yamac, Cambeth, and Twilight soils and soils that have slopes of less than 4 percent. Included areas make up about 10 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabbart soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and

silty sedimentary beds. Typically, the surface layer is grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray, semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are poorly suited to cultivated crops because they are droughty and are underlain by root-limiting material.

Rangeland.—The potential native plant community on the Cabbart soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Rangeland seeding of native plants is a suitable practice to convert land to rangeland from other uses. Limited use of mechanical treatment practices such as contour furrowing and scalping can improve deteriorated areas of rangeland.

Windbreaks.—These soils are not suited to windbreaks because of their very low available water capacity.

Homesite development.—These soils are poorly suited to homesite development. The Cabbart soil is limited mainly by slow permeability of the underlying sedimentary beds, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Yawdim soil is limited for use as homesites mainly by shallow depth to semiconsolidated shale, shrink-swell potential, low soil strength, and slow permeability. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. This soil is poorly suited to septic tank absorption fields because of the slow permeability and shallow depth to semiconsolidated shale. Shrinking and swelling, low soil strength, and shallow depth to semiconsolidated shale can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIe, nonirrigated. The Cabbart soil is in Shallow range site, 10- to 14-inch precipitation zone, and the Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone.

36—Cabbart-Yawdim complex, 15 to 45 percent slopes. This map unit is on the sides and tops of ridges and hills in the west-central part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Cabbart silt loam and about 35 percent Yawdim silty clay.

Included in this unit are small areas of Fleak, Yamac, and Gerdrum soils and shale outcroppings. Included areas make up about 20 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Cabbart soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Cabbart soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Use of mechanical treatment practices is not practical. These soils are not suited to rangeland seeding because of the steepness of slope.

Windbreaks.—These soils are not suited to windbreaks because of the steepness of slope and the very low available water capacity.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope and the shallow depth to semiconsolidated shale in the Yawdim soil.

This map unit is in capability subclass VIIe, nonirrigated. The Cabbart soil is in Shallow range site, 10- to 14-inch precipitation zone, and the Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone.

37—Cambert loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on the sides and tops of knolls and low hills in the eastern part of the county. It formed in material derived from weakly consolidated, silty sedimentary beds. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Lisk, Dast, Barkof, Bryant, and Zahill soils. The Lisk, Dast, and Zahill soils are highly susceptible to soil blowing. The Dast and Barkof soils are droughty and thus are low in productivity. The Lisk soils are on fans and foot slopes, and the Dast, Barkof, and Zahill soils are on the upper side slopes and on the tops of knolls and low hills. The Bryant soils do not adversely affect the use and management of this unit for nonirrigated farming or as rangeland.

Typically, this Cambert soil has a surface layer of brown loam 4 inches thick. The subsoil is mostly brown loam 9 inches thick. The substratum to a depth of 26 inches is very pale brown silty clay loam. Below this to a depth of 60 inches or more are pale yellow and light gray, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of

soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

This soil is used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the moderate hazards of soil blowing and water erosion and moderate available water capacity. Minimum tillage, contour cultivation, grassed waterways, and stripcropping reduce soil blowing and water erosion. Organic matter content and availability of moisture in the surface layer can be increased by stubble mulch tillage.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by low soil strength and the slow permeability of the underlying sedimentary beds. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

38—Cambert-Barkof-Cabba complex, 4 to 15 percent slopes. This map unit is on uplands, mainly in the east-central and southeastern parts of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Cambert loam, 25 percent Barkof silty clay, and 25 percent Cabba loam. The Cambert and Barkof soils are on foot slopes and side slopes of hills and ridges, and the Cabba soil is on the tops of hills and ridges.

Included in this unit are small areas of Bryant and Dast soils. Also included are small areas of soils that have slopes of less than 4 percent. Included areas make up about 10 percent of the total acreage. The moderately deep Dast soils are highly susceptible to soil blowing. They are on the upper side slopes and tops of hills and ridges. The Bryant soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Cambert soil is moderately deep and well drained. It formed in material derived from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown loam 4 inches thick. The subsoil is mostly brown loam 9 inches thick. The substratum to a depth of 26 inches is very pale brown silty clay loam. Below this to a depth of 60 inches or more is pale yellow and light gray, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

The Barkof soil is moderately deep and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer, where mixed to a depth of 7 inches, is grayish brown silty clay. The subsoil is mostly light brownish gray silty clay 19 inches thick. The substratum to a depth of 29 inches is light gray silty clay. Below this to a depth of 60 inches or more is mainly white semiconsolidated shale. Semiconsolidated shale is at a depth of 20 to 40 inches.

Permeability is slow, and available water capacity is low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is droughty.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches

or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion, the low and very low available water capacity of the Barkof and Cabba soils, and the limited rooting depth of the Cabba soil. The surface layer of these soils is low in content of organic matter. The Cambert and Cabba soils are high in content of lime. Crops respond well to the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of these soils. Subsoiling the Cabba soil increases the effective rooting depth. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on the Cambert soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Barkof soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, western wheatgrass, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Cambert soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Barkof and Cabba soils are poorly suited to windbreaks. The low and very low available water capacity of these soils limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Cambert and Cabba soils are limited mainly by low soil strength and slow permeability of the underlying sedimentary beds. The Barkof soil is limited mainly by slow permeability, low soil strength, potential for shrinking and swelling, and moderate depth to semiconsolidated shale. These soils are poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds in the Cambert and Cabba soils and the moderate depth to semiconsolidated shale in the Barkof soil. Buildings can be designed to offset the effects of shrinking and swelling. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. The Cambert soil is in Silty range site, 10- to 14-inch precipitation zone; the Barkof soil is in Clayey range site, 10- to 14-inch precipitation zone; and the Cabba soil is in Shallow range site, 10 to 14-inch precipitation zone.

39—Cambert-Cabba loams, 8 to 15 percent slopes. This map unit is on uplands in the eastern part of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Cambert loam and 35 percent Cabba loam. The Cambert soil is on the side slopes and foot slopes of hills and ridges, and the Cabba soil is on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Barkof, Dast, Bryant, and Lisk soils. Included areas make up about 15 percent of the total acreage. The Dast and Barkof soils are on the sides and tops of hills. These soils are droughty, are low in productivity, and are highly susceptible to soil blowing. The Lisk soils are on fans and foot slopes. They are highly susceptible to soil blowing. The Bryant soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated crops.

The Cambert soil is moderately deep and well drained. It formed in material derived from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown loam 4 inches thick. The subsoil is mostly brown loam 9 inches thick. The substratum to a depth of 26 inches is very pale brown silty clay loam. Below this to a depth of 60 inches or more are pale yellow and light gray, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by droughtiness, the shallow depth to weakly consolidated sedimentary beds, and the limited rooting depth of the Cabba soil and by the hazards of soil blowing and water erosion. The surface layer of these soils is high in content of lime and low in content of organic matter. Crops respond well to the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Subsoiling the Cabba soil increases the effective rooting depth. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on the Cambert soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, western wheatgrass, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and

adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Cambert soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Cabba soil is poorly suited to windbreaks. The very low available water capacity of this soil limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by the slow permeability of the underlying sedimentary beds and low soil strength. These soils are poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IVe, nonirrigated. The Cambert soil is in Silty range site, 10- to 14-inch precipitation zone, and the Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone.

40—Cambert-Dast-Cabba complex, 4 to 15 percent slopes. This map unit is on uplands in the eastern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 30 percent Cambert loam, 25 percent Dast fine sandy loam, and 25 percent Cabba loam. The Cambert and Dast soils are on side slopes and foot slopes of hills and ridges, and the Cabba soil is on the tops of hills and ridges.

Included in this unit are small areas of Barkof, Lisk, and Macar soils. Also included are small areas of soils that have slopes of less than 4 percent. Included areas make up about 20 percent of the total acreage. The Lisk and Macar soils are on fans and lower side slopes. They are highly susceptible to soil blowing. The Barkof soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Cambert soil is moderately deep and well drained. It formed in material derived from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown loam 4 inches thick. The subsoil is mostly brown loam 9 inches thick. The substratum to a depth of 26 inches is very pale brown silty clay loam. Below this to a depth of 60 inches or more are pale yellow and light gray, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

The Dast soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 3 inches thick. The underlying material to a depth of 25 inches is brown very pale brown and light gray fine sandy loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 36 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown and pale yellow loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion, the low and very low available water capacity of the Dast and Cabba soils, and the limited rooting depth of the Cabba soil. The surface layer of these soils is low in content of organic matter and high in content of lime. Crops respond well to

the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Subsoiling the Cabba soil increases the effective rooting depth. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on the Cambert soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Dast soil is mainly prairie sandreed, little bluestem, needleandthread, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, western wheatgrass, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Cambert soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Dast and Cabba soils are poorly suited to windbreaks. The low and very low available water capacity of these soils limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—The Cambert and Cabba soils are poorly suited to homesite development. They are limited mainly by low soil strength and the slow permeability of the underlying sedimentary beds. These soils are poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

The Dast soil is suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. The Cambert soil is in Silty range site, 10- to 14-inch precipitation zone; the Dast soil is in Sandy range site, 10- to 14-inch precipitation zone; and the Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone.

41—Cambeth silt loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on the sides and tops of low hills in the west-central and southwestern parts of the county. It formed in material derived from weakly consolidated, silty sedimentary beds. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Floweree, Lonna, Busby, and Yawdim soils. The shallow, well drained Yawdim soils are on knolls. They are droughty and low in productivity. The Lonna and Busby soils are highly susceptible to soil blowing. The Floweree soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Cambeth soil has a surface layer of brown silt loam 6 inches thick. The subsoil is light

yellowish brown and pale yellow silt loam 7 inches thick. The substratum to a depth of 35 inches is pale yellow silt loam. Below this to a depth of 60 inches or more are white, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 24 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 6 inches.

This soil is used primarily as rangeland. It is also used for nonirrigated crops, mainly wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by moderate available water capacity and the hazards of water erosion and soil blowing. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by the slow permeability of the underlying sedimentary beds, shrink-swell potential, and low soil strength. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

42—Cambeth-Cabbart silt loams, 8 to 15 percent slopes. This map unit is on hills and ridges in the west-central and southwestern parts of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Cambeth silt loam and 35 percent Cabbart silt loam. The moderately sloping Cambeth soil is on the sides and tops of hills, and the Cabbart soil is on the tops of hills and ridges.

Included in this unit are small areas of Yawdim, Busby, Yamac, and Fleak soils. Included areas make up about 15 percent of the total acreage. The shallow, well drained Yawdim soils and the shallow, somewhat excessively drained Fleak soils are on the tops of hills and ridges. They are droughty and are low in productivity. The Busby and Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Cambeth soil is moderately deep and well drained. It formed in material derived dominantly from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown silt loam 6 inches thick. The subsoil is mostly light yellowish brown silt loam 7 inches thick. The substratum to a depth of 35 inches is pale yellow silt loam. Below this to a depth of 60 inches or more are white, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 24 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Cabbart soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary

beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. This soil is calcareous throughout. It is droughty.

These soils are used primarily as rangeland. They are also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion. The Cabbart soil is also limited by very low available water capacity. The surface layer of this soil is high in content of lime and low in content of organic matter. Crops on these soils respond well to the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on the Cambeth soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Cabbart soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Cambeth soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Cabbart soil is not suited to windbreaks. It is limited mainly by the very low available water capacity.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by slow permeability of the underlying sedimentary beds, shrink-swell potential, and low soil strength. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. These soils are poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential.

This map unit is in capability subclass IVe, nonirrigated. The Cambeth soil is in Silty range site, 10- to 14-inch precipitation zone, and the Cabbart soil is in Shallow range site, 10- to 14-inch precipitation zone.

43—Cambeth-Twilight-Cabbart complex, 4 to 15 percent slopes. This map unit is on uplands in the west-central and southwestern parts of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Cambeth silt loam, 30 percent Twilight fine sandy loam, and 20 percent Cabbart silt loam. The Cambeth and Twilight soils are on the sides of hills and ridges, and the Cabbart soil is on the tops of hills and ridges.

Included in this unit are small areas of Fleak, Yamac, and Yawdim soils. Included areas make up about 10 percent of the total acreage. The shallow, well drained Yawdim soils and the shallow, somewhat excessively drained Fleak soils are on the tops of hills and ridges. They are droughty and are low in productivity. The Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Cambeth soil is moderately deep and well drained. It formed in material derived dominantly from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown silt loam 6 inches thick. The subsoil is mostly light yellowish brown silt loam 7 inches thick. The substratum to a depth of 35 inches is pale yellow silt loam. Below this to a depth of 60 inches are more white, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 24 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Twilight soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 5 inches thick. The upper 5 inches of the subsoil is brown fine sandy loam, and the lower 6 inches is pale brown fine sandy loam. The substratum to a depth of 25 inches is light brownish gray sandy loam. Below this to a depth of 60 inches or more are light brownish gray, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is droughty.

The Cabbart soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

Most areas of these soils are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—If these soils are used for nonirrigated crops, they are limited mainly by the restricted available water capacity and the hazards of soil blowing and water erosion. The Cabbart soil is droughty and is low in productivity. The restricted available water capacity of the soils makes water conservation necessary. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on the Cambeth soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Twilight soil is mainly prairie sandreed, little bluestem, thickspike wheatgrass, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of thickspike wheatgrass, needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Cabbart soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as

shallow chiseling and scalping. All tillage should be on the contour or across the slope.

Windbreaks.—The Cambeth soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Twilight soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

The Cabbart soil is poorly suited to windbreaks. It is limited mainly by the very low available water capacity.

Homesite development.—The Cambeth and Cabbart soils are poorly suited to homesite development. They are limited mainly by the slow permeability of the underlying sedimentary beds, shrink-swell potential, and low soil strength. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. These soils are poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds.

The Twilight soil is suited to homesite development. It has few limitations.

This map unit is in capability subclass IVe, nonirrigated. The Cambeth soil is in Silty range site, 10- to 14-inch precipitation zone; the Twilight soil is in Sandy range site, 10- to 14-inch precipitation zone; and the Cabbart soil is in Shallow range site, 10- to 14-inch precipitation zone.

44—Cherry silt loam, 0 to 4 percent slopes. This deep, well drained soil is on fans and terraces in the east-central and southeastern parts of the county. It formed in alluvium. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Alona, Bryant, Cambert, and Havrelon soils. The Alona soils are moderately salt-affected and strongly sodium-affected and are on terraces and fans. The salts and sodium reduce the availability of moisture and some plant nutrients, which limits crop yields. The Havrelon soils are on low terraces and flood plains. They are subject to flooding. The Bryant and Cambert soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Cherry soil has a surface layer of light brownish gray silt loam 3 inches thick. The subsoil is mostly pale yellow and light brownish gray silt loam 21 inches thick. The substratum to a depth of 60 inches or more is pale yellow and light brownish gray silt loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

This soil is used as rangeland, for irrigated farming, and for nonirrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. The surface layer of this soil is high in content of lime and low in content of organic matter. Crops respond well to the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Leveling is needed in sloping areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by low soil strength, shrink-swell potential, and moderately slow

permeability. If this soil is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

45—Cherry-Havrelon-Trembles complex, 0 to 2 percent slopes. This map unit is on terraces and flood plains along the major drainageways in the eastern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 30 percent Cherry silt loam, 30 percent Havrelon loam, and 30 percent Trembles fine sandy loam. The Havrelon and Trembles soils are on flood plains and low terraces, and the Cherry soil is on high terraces.

Included in this unit are small areas of Alona soils; Typic Fluvaquents, saline; and Shambo soils. Also included are small areas of soils on short, steep slopes along terrace edges. Included areas make up about 10 percent of the total acreage. The Alona soils are moderately salt-affected and strongly sodium-affected. The salts and sodium reduce the availability of moisture and some plant nutrients, which limits crop yields. The Typic Fluvaquents, saline, are in stream channels and on narrow flood plains. The Shambo soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

The Cherry soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray silt loam 3 inches thick. The subsoil is mostly pale yellow and light brownish gray silt loam 21 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray silt loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is calcareous throughout.

The Havrelon soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown loam 5 inches thick. The underlying material to a depth of 60 inches or more is pale brown very fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is subject to occasional periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks. This soil is calcareous throughout.

The Trembles soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown fine sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown and light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to occasional periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks. The soil is calcareous throughout.

These soils are used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown.

Cropland.—These soils are suited to nonirrigated and irrigated crops. They are limited mainly by the hazard of soil blowing. The surface layer of these soils has low organic matter content. Crops respond well to the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases organic matter content and increases fertility. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. Water spreading is also used to irrigate these soils. To provide an adequate length of run, land leveling may be needed to level the short, steep terrace edges.

Rangeland.—The potential native plant community on the Cherry and Havrelon soils is mainly western wheatgrass, green needlegrass, little bluestem, big bluestem, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as thistles, Kentucky bluegrass, annuals, and weedlike forbs may invade. The potential native plant community on the Havrelon soil produces about 2,000 pounds per acre of

air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation. On the Cherry soil it produces about 1,800 pounds per acre in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The potential native plant community on the Trembles soil is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, blue grama, and silver sagebrush increases. If excessive grazing continues, plants such as thistles, annuals, and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. If the plant cover is disturbed for seeding or mechanical treatment, protection from flooding may be needed to control gullying and sheet erosion until the plant cover is sufficiently reestablished.

Windbreaks.—The Cherry soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Havrelon soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

The Trembles soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—These soils are poorly suited to homesite development. The Cherry soil is limited mainly by low soil strength, shrink-swell potential, and moderately slow permeability. Use of gravel backfill in the septic tank absorption line trench, excavated to a suitable depth, helps to compensate for the moderately slow permeability. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Havrelon and Trembles soils are poorly suited to homesite development because of the hazard of occasional flooding.

This map unit is in capability subclasses IIIw, nonirrigated and irrigated. The Cherry and Havrelon soils are in Silty range site, 10- to 14-inch precipitation zone, and the Trembles soil is in Sandy range site, 10- to 14-inch precipitation zone.

46—Chinook fine sandy loam, 0 to 4 percent slopes. This deep, well drained soil is on fans and terraces in the northwestern part of the county. It formed in alluvial and eolian material. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Yamac, Floweree, and Rominell soils. The deep, well drained, salt- and sodium-affected Rominell soils are on fans and terraces. The content of salts and sodium in these soils reduces the availability of moisture and some plant nutrients. Also, it restricts the penetration of roots and moisture, which limits crop yields. The Yamac and Floweree soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Chinook soil has a surface layer of dark grayish brown fine sandy loam 6 inches thick. The subsoil is mostly brown fine sandy loam 23 inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the high hazard of soil blowing and moderate available water capacity. Stripcropping and planting field windbreaks help to control soil blowing and conserve moisture.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of

needleandthread, perennial short grasses, perennial forbs, and silver sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

47—Chinook fine sandy loam, 4 to 8 percent slopes. This deep, well drained soil is on fans and foot slopes in the western part of the county. It formed in alluvial and eolian material. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Yamac, Fleak, Floweree, and Rominell soils. The deep, well drained, salt- and sodium-affected Rominell soils are on fans and foot slopes. The content of salts and sodium in these soils reduces the availability of moisture and some plant nutrients. Also, it restricts the penetration of roots and moisture, which limits crop yields. The shallow, somewhat excessively drained Fleak soils are on the upper side slopes and tops of hills and ridges. They are droughty and are low in productivity. The Yamac and Floweree soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Chinook soil has a surface layer of dark grayish brown fine sandy loam 6 inches thick. The subsoil is brown and light brownish gray fine sandy loam 23 inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion and moderate available water capacity. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. Tall grass barriers also trap snow, which increases the amount of moisture in the soil.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and silver sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

48—Chinook fine sandy loam, 8 to 15 percent slopes. This deep, well drained soil is on hillsides in the west-central part of the county. It formed in alluvial and eolian material. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Busby, Kremlin, Fleak, and Yamac soils. The shallow, somewhat excessively drained Fleak soils are on the upper side slopes and tops of hills and ridges. These soils are droughty and are low in productivity. The Busby, Kremlin, and Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Chinook soil has a surface layer of dark grayish brown fine sandy loam 6 inches thick. The subsoil is mostly brown fine sandy loam 23 inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 28 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Most areas of this soil are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of water erosion and soil blowing and by moderate available water capacity. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. Tall grass barriers also trap snow, which increases the amount of moisture in the soil.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and silver sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is well suited to homesite development. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass IVe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

49—Chinook fine sandy loam, gullied, 2 to 8 percent slopes. This deep, well drained soil is on fans, foot slopes, and terraces in the north-central and west-central parts of the county. It commonly is dissected by gullies. The soil formed in alluvial and eolian material. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Rominell; Rominell, gullied; Fleak; Twilight; and Kremlin soils. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Chinook soil has a surface layer of dark grayish brown fine sandy loam 6 inches thick. The subsoil is mostly brown fine sandy loam 23 inches thick. The substratum to a depth of 60 inches or more is grayish brown and light brownish gray sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 28 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because the many deep, narrow gullies make tillage difficult. The gullies are 2 to 10 feet deep, as much as 5 feet wide, and 100 to 500 feet apart. They are produced by concentrated runoff from adjacent areas of Badland.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and silver sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed.

Proper grazing use insures good plant vigor and adequate plant cover. The many deep, narrow gullies make seeding and mechanical treatment difficult.

Windbreaks.—Smooth areas of this soil between the gullies are suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is suited to homesite development. The main limitation is the many gullies, which limit access. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass VIe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

50—Creed loam, 0 to 8 percent slopes. This deep, well drained, salt- and sodium-affected soil is on fans and terraces in the western and northern parts of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Kremlin, Gerdrum, Chinook, and Ethridge soils. The Chinook soils are highly susceptible to soil blowing. The Kremlin, Gerdrum, and Ethridge soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Creed soil has a surface layer of grayish brown loam 3 inches thick. The subsurface layer is grayish brown and light brownish gray loam 5 inches thick. The subsoil is light brownish gray silty clay 16 inches thick. The substratum to a depth of 60 inches or more is light brownish gray silty clay and silty clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is slightly salt-affected and moderately sodium-affected at a depth of about 8 inches.

Most areas of this soil are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—If this soil is used for nonirrigated crops, it is limited by the content of salts in the subsoil and the hazards of soil blowing and water erosion. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion. Subsoiling improves infiltration of the water and allows salts to be leached downward.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, perennial forbs, fringed sagewort, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,500 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks. It is salt-affected, however, which limits the choice of trees and shrubs to those that are salt-tolerant. Suitable trees for planting are Russian-olive, black hawthorn, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVe, nonirrigated. It is in Clay Pan range site, 10- to 14-inch precipitation zone.

51—Creed-Gerdrum complex, 0 to 8 percent slopes. This map unit is on fans and terraces in the western and northern parts of the county. Slopes are

mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Creed loam and 35 percent Gerdrum clay loam. The Gerdrum soil is in small depressional areas surrounded by the Creed soil.

Included in this unit are small areas of Kremlin, Thoeny, Absher, and Fleak soils and areas of sandstone and shale outcroppings. Included areas make up about 15 percent of the total acreage. The Absher soils are in small, shallow, barren depressional areas. These soils are moderately sodium-affected and strongly salt-affected and have a thin surface crust. These factors severely limit seedling emergence and the penetration of roots and moisture. The Fleak soils are shallow, well drained, and droughty. They are on knolls and ridges of low hills. The Absher and Fleak soils are low in productivity. The sandstone and shale outcroppings are on ridges of low hills and can be easily farmed around. The Kremlin and Thoeny soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Creed soil is deep and well drained and is salt- and sodium-affected. It formed in alluvium. Typically, the surface layer is grayish brown loam 3 inches thick. The subsurface layer is grayish brown and light brownish gray loam 5 inches thick. The subsoil is light brownish gray silty clay 16 inches thick. The substratum to a depth of 60 inches or more is light brownish gray silty clay and silty clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is slightly salt-affected and moderately sodium-affected at a depth of about 8 inches.

The Gerdrum soil is deep and well drained and is salt- and sodium-affected. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is light brownish gray clay loam. The upper 4 inches of the subsoil is light brownish gray clay, and the lower 9 inches is light brownish gray clay loam. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 7 inches.

Most areas of these soils are used as rangeland. A few areas are used for nonirrigated crops, mainly wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited by the content of salts and sodium and by surface crusting of the Gerdrum soil. Both soils are susceptible to water erosion and soil blowing. Subsoiling improves water infiltration and allows salts to be leached downward. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on the Creed soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, perennial forbs, fringed sagewort, big sagebrush, and other perennial short grasses increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,500 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

The potential native plant community on the Gerdrum soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as chiseling, scalping, and contour furrowing.

Windbreaks.—The Creed soil is suited to windbreaks. It is salt-affected, however, which limits the choice of trees and shrubs to those that are salt-tolerant. Suitable trees for planting are Russian-olive, black hawthorn, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Gerdrum soil is suited to windbreaks. It is strongly salt-affected, however, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If these soils are used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVe, nonirrigated. Both soils are in Clay Pan range site, 10- to 14-inch precipitation zone.

52—Dast fine sandy loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on the sides and tops of knolls and low hills in the east-central and southeastern parts of the county. It formed in material derived from weakly consolidated, sandy sedimentary beds. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Lisk, Cambert, Macar, Shambo, and Tally soils. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Dast soil has a surface layer of brown fine sandy loam 3 inches thick. The underlying material to a depth of 25 inches is light gray and very pale brown fine sandy loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

This soil is used for nonirrigated farming and as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by low available water capacity and the high hazard of soil blowing. Because of droughtiness, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce soil blowing.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, needleandthread, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling.

Windbreaks.—This soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

53—Dast fine sandy loam, 8 to 15 percent slopes. This moderately deep, well drained soil is on the sides and tops of hills and ridges in the east-central and southeastern parts of the county. It formed in material derived from weakly consolidated, sandy sedimentary beds. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Lisk, Cambert, Macar, Shambo, and Tally soils. Also included are small areas of sandstone outcroppings. The sandstone outcroppings are on the top of hills and ridges and can be farmed around. The included soils do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Dast soil has a surface layer of brown fine sandy loam 3 inches thick. The underlying material to a depth of 25 inches is light gray and very pale brown

fine sandy loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 36 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

This soil is used for nonirrigated farming and as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by low available water capacity, the high hazard of soil blowing, and the moderate hazard of water erosion. Because of the droughtiness of the soil, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce soil blowing and water erosion. Water erosion is also reduced if fall grain is seeded early and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, needleandthread, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—This soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—This soil is suited to homesite development. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

54—Dast-Blanchard complex, 2 to 8 percent slopes. This map unit is on low hills in the eastern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Dast fine sandy loam and 35 percent Blanchard loamy sand. The Dast soil is on the sides and tops of hills, and the Blanchard soil is on fans and foot slopes and in areas that are protected from the prevailing winds.

Included in this unit are small areas of Lisk, Cabba, Macar, and Tally soils. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Dast soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 3 inches thick. The underlying material to a depth of 25 inches is light gray and very pale brown fine sandy loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. The soil is droughty.

The Blanchard soil is deep and excessively drained. It formed in sandy alluvial and eolian material. Typically, the surface layer is grayish brown loamy sand 7 inches thick. The upper 29 inches of the underlying material is light brownish gray loamy sand, and the lower part to a depth of 60 inches or more is light yellowish brown loamy coarse sand.

Permeability is rapid, and available water capacity is low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 48 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. The soil is droughty.

These soils are used mainly as rangeland. They are also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are poorly suited to cultivated crops. They are limited mainly by droughtiness and the high hazard of soil blowing. Because of the droughtiness of the soils, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce soil blowing. Tall grass barriers trap snow, which increases the amount of moisture in the soil.

Rangeland.—The potential native plant community on the Dast soil is mainly prairie sandreed, little bluestem, needleandthread, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Blanchard soil is mainly sand bluestem, prairie sandreed, Indian ricegrass, little bluestem, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, sand dropseed, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice on these soils. Special precautions must be taken to reduce soil blowing until the plant cover is reestablished.

Windbreaks.—These soils are suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are suited to homesite development. The Dast soil has few limitations. The Blanchard soil is limited mainly by the instability and rapid permeability of the underlying material. Therefore, cutbanks are not stable and are subject to slumping, and effluent from septic tank absorption fields may contaminate ground water. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. The Dast soil is in Sandy range site, 10- to 14-inch precipitation zone, and the Blanchard soil is in Sands range site, 10- to 14-inch precipitation zone.

55—Dast-Blanchard complex, 8 to 25 percent slopes. This map unit is on hills and ridges in the east-central and southeastern parts of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Dast fine sandy loam and 35 percent Blanchard loamy sand. The strongly sloping to moderately steep Dast soil is on the sides and tops of hills and ridges, and the strongly sloping Blanchard soil is on fans and foot slopes and in areas that are protected from the prevailing winds.

Included in this unit are small areas of Lisk, Macar, and Cabba soils. Also included are small areas of sandstone outcroppings. Included areas make up about 20 percent of the total acreage. These soils do not adversely affect the use and management of this unit as rangeland. The areas of sandstone outcroppings limit the range production of the unit.

The Dast soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 3 inches thick. The underlying material to a depth of 25 inches is light gray and very pale brown fine sandy loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 32 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is droughty.

The Blanchard soil is deep and excessively drained. It formed in sandy alluvial and eolian material. Typically, the surface layer is grayish brown loamy sand 7 inches thick. The upper 29 inches of the underlying material is grayish brown and light brownish gray loamy sand, and the lower part to a depth of 60 inches or more is light yellowish brown loamy coarse sand.

Permeability is rapid, and available water capacity is low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 40 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. The soil is droughty.

These soils are used mainly as rangeland.

Cropland.—These soils are poorly suited to cultivated crops because of droughtiness, steepness of slope, and the high hazard of soil blowing.

Rangeland.—The potential native plant community on the Dast soil is mainly prairie sandreed, little bluestem, needleandthread, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Blanchard soil is mainly sand bluestem, prairie sandreed, Indian ricegrass, little bluestem, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, sand dropseed, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice on these soils. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture. Special precautions must be taken to reduce soil blowing until the plant cover is reestablished.

Windbreaks.—Areas of the Dast soil that have slopes of less than 15 percent and the Blanchard soil are suited to windbreaks, but the low available water capacity of the soils limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac. Areas of the Dast soil that have slopes of more than 15 percent are poorly suited to windbreaks.

Homesite development.—Areas of the Dast soil that have slopes of less than 15 percent are suited to homesite development. They have few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Areas of the Dast soil that have slopes of more than 15 percent are poorly suited to homesite development.

The Blanchard soil is suited to homesite development. It is limited mainly by the rapid permeability and instability of the underlying material. Cutbanks are not stable and are subject to slumping, and effluent from septic tank absorption fields may contaminate ground water. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass VIe, nonirrigated. The Dast soil is in Sandy range site, 10- to 14-inch precipitation zone, and the Blanchard soil is in Sands range site, 10- to 14-inch precipitation zone.

56—Dimmick silty clay. This deep, very poorly drained, wet soil is in depressional areas and oxbows in the northern part of the county and in large, undrained lake basins in the west-central part. It formed in clayey alluvium. Slope is 0 to 1 percent. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Harlem and Lohler soils. These included areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Dimmick soil has a surface layer of gray silty clay 7 inches thick. The underlying material to a depth of 60 inches or more is gray and olive gray silty clay.

Permeability is very slow, and available water capacity is high. Effective rooting depth and the wetting depth are 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to frequent periods of ponding during high intensity storms and spring runoff. It is also ponded by excess irrigation water runoff from surrounding fields. It has a water table from 1 foot above to 2 feet below the soil surface from April through September.

This soil is used as rangeland and wetland marsh.

Cropland.—This soil is not suited to cultivated crops because of wetness.

Rangeland.—The potential native plant community is mainly prairie cordgrass, tall sedges, western wheatgrass, and American sloughgrass. If the range is excessively grazed, the proportion of these plants decreases and the proportion of rushes and water plantain increases. If excessive grazing continues, plants such as curly dock and Baltic rush may invade. The potential native plant community produces about 6,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 5,000 pounds in years of below-normal precipitation.

Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Except in fall, the use of mechanical renovation practices to improve forage production may be limited by wetness. Reestablishing plant cover is difficult.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by wetness during the growing season.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of frequent ponding and because of wetness.

This map unit is in capability subclass Vw, nonirrigated. It is in Wet Meadow range site, 10- to 14-inch precipitation zone.

57—Dimmick clay, drained. This deep soil is in large lake basins in the northeastern part of the county. It formed in clayey alluvium. Slope is 0 to 1 percent. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Marvan and Pendroy soils. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Dimmick soil has a surface layer of dark gray clay 7 inches thick. The underlying material to a depth of 60 inches or more is mostly dark gray clay.

Permeability is very slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is more than 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil has a water table at a depth of 1 foot to 3 feet from April to August. A system of surface drains has been installed to remove excess water. Rare periods of ponding may occur on this soil during high intensity storms and spring runoff.

This soil is used mainly for nonirrigated farming. It is also used as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to cultivated crops. It is limited mainly by very slow permeability, rare periods of ponding, and the clayey texture of the surface layer. Seasonal ponding limits the production of crops. The soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. The addition of organic matter through stubble mulch tillage improves soil tilth.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,400 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, black hawthorn, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare ponding and because of wetness.

This map unit is in capability subclass IVw, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

58—Ethridge silty clay loam, 0 to 4 percent slopes. This deep, well drained soil is on terraces and fans in the west-central part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Evanston, Creed, Lonna, and Yamac soils. The Yamac and Lonna soils are on fans and terraces. They are highly susceptible to soil blowing. The salt- and sodium-affected Creed soils are on terraces and the lower part of fans. The salts and sodium reduce the availability of moisture and plant nutrients and restrict the penetration of roots and moisture into the subsoil. These characteristics limit crop yields. The Evanston soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Ethridge soil has a surface layer of grayish brown silty clay loam 3 inches thick. The upper 8 inches of the subsoil is dark grayish brown silty clay loam, and the lower 22 inches is light brownish gray silty clay loam. The substratum to a depth of 60 inches or more is light brownish gray silty clay.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 11 inches.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants

decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Control of sagebrush to reduce competition with desirable forage plants is a suitable practice.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

59—Ethridge silty clay loam, 4 to 8 percent slopes. This deep, well drained soil is on fans in the west-central part of the county. It formed in alluvium. Slopes are mainly 250 to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Evanston, Creed, Lonna, and Yamac soils. The Lonna and Yamac soils are highly susceptible to soil blowing. The salt- and sodium-affected Creed soils are on the lower part of fans. The salts and sodium reduce the availability of moisture and plant nutrients and restrict the penetration of roots and moisture into the subsoil. These characteristics limit crop yields. The Evanston soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Ethridge soil has a surface layer of grayish brown silty clay loam 3 inches thick. The upper 8 inches of the subsoil is dark grayish brown silty clay, and the lower 22 inches is light brownish gray silty clay loam. The substratum to a depth of 60 inches or more is light brownish gray silty clay.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 11 inches.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the moderate hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Control of sagebrush to reduce competition with desirable forage species is a suitable practice.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

60—Evanston loam, 0 to 2 percent slopes. This deep, well drained soil is on fans and terraces in the western part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Ethridge, Yamac, and Creed soils and soils that have a loamy surface layer and subsoil and have a gravelly substratum at a depth of 20 to 40 inches. The soils that have a gravelly substratum are droughty and are low in productivity. The Creed soils are in shallow depressional areas on fans and terraces. They are moderately affected by sodium below a depth of about 8 inches, which limits yields by restricting the penetration of roots and moisture and reducing the amount of moisture available to plants. The Ethridge and Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Evanston soil has a surface layer of dark grayish brown loam 8 inches thick. The subsoil is dark grayish brown and grayish brown clay loam 18 inches thick. The substratum to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This soil is used mainly as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling or scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by shrink-swell potential, low soil strength, and moderate permeability. If this soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

61—Evanston loam, 2 to 8 percent slopes. This deep, well drained soil is on fans in the western part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Ethridge, Yamac, and Creed soils and soils that have a loamy surface layer and subsoil and have a gravelly substratum

at a depth of 20 to 40 inches. The soils that have a gravelly substratum are droughty and are low in productivity. The Creed soils are in shallow depressional areas on fans. They are moderately affected by sodium below a depth of about 8 inches, which limits yields by restricting the penetration of roots and moisture and reducing the amount of moisture available to plants. The Ethridge and Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Evanston soil has a surface layer of dark grayish brown loam 8 inches thick. The subsoil is dark grayish brown and grayish brown clay loam 18 inches thick. The substratum to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This soil is used mainly as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of water erosion and soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by shrink-swell potential, low soil strength, and moderate permeability. If this soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

62—Evanston-Gerdrum complex, 2 to 8 percent slopes. This map unit is on fans and terraces in the western part of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 60 percent Evanston loam and about 25 percent Gerdrum clay loam. The Gerdrum soil is in small, shallow depressional areas surrounded by the Evanston soil.

Included in this unit are small areas of Kremlin, Yamac, and Creed soils. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Evanston soil is deep and well drained. It formed in alluvium. The surface layer is dark grayish brown loam 8 inches thick. The subsoil is dark grayish brown and grayish brown clay loam 18 inches thick. The substratum to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Gerdrum soil is deep and well drained and is affected by salts and sodium. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is light brownish gray clay loam. The upper 4 inches of the subsoil is light brownish gray clay, and the lower 9 inches is light brownish gray clay loam. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 7 inches.

Most areas of these soils are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited by the content of salts and sodium in the subsoil of the Gerdrum soil and the hazards of water erosion and soil blowing. Subsoiling improves water infiltration and allows salts to be leached downward. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on the Evanston soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The potential native plant community on the Gerdrum soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—The Evanston soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

The Gerdrum soil is poorly suited to windbreaks. It is strongly salt-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by slow and moderate permeability, shrink-swell potential, and low soil strength. If buildings are constructed on these soils, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. If these soils are used for septic tank absorption fields, the limitation of slow or moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVe, nonirrigated. The Evanston soil is in Silty range site, 10- to 14-inch precipitation zone, and the Gerdrum soil is in Clay Pan range site, 10- to 14-inch precipitation zone.

63—Farland silt loam, 0 to 4 percent slopes. This deep, well drained soil is on fans and terraces in the eastern part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Farnuf, Savage, Bryant, Cherry, and Cambert soils. The Cherry soils are highly susceptible to soil blowing. The Farnuf, Savage, Bryant, and Cambert soils do not adversely affect the use and management of this unit for nonirrigated farming or as rangeland.

Typically, this Farland soil has a surface layer of grayish brown and dark grayish brown silt loam 4 inches thick. The upper 11 inches of the subsoil is dark grayish brown silty clay loam, and the lower 15 inches is grayish brown silt loam. The substratum to a depth of 60 inches or more is light gray silt loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow,

and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

Most areas of this soil are used for nonirrigated farming. A few areas are used as rangeland. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the moderate hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and fringed sagewort increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to . homesite development. It is limited mainly by moderate permeability, shrink-swell potential, and low soil strength. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. If this soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

64—Farnuf loam, 0 to 4 percent slopes. This deep, well drained soil is is on fans and terraces in the eastern part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Farland, Williams, Savage, Cambert, and Shambo soils. These areas do not adversely affect the use and management of this unit for nonirrigated crops and as rangeland.

Typically, this Farnuf soil has a surface layer of dark grayish brown loam 6 inches thick. The upper 9 inches of the subsoil is dark grayish brown clay loam, and the lower 9 inches is brown clay loam. The substratum to a depth of 60 inches or more is pale yellow and light yellowish brown loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

Most areas of this soil are used for nonirrigated crops. A few areas are used as rangeland. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, little bluestem, plains muhly, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderate permeability, low soil strength, and the potential for

shrinking and swelling. Buildings can be designed to offset the effects of shrinking and swelling. If this soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

65—Floweree silt loam, 0 to 4 percent slopes. This deep, well drained soil is on fans and terraces in the west-central and southwestern parts of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambeth, Lonna, Kremlin, and Ethridge soils. The deep, well drained Lonna soils are on terraces. They are highly susceptible to soil blowing. The Cambeth, Kremlin, and Ethridge soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Floweree soil has a surface layer of grayish brown silt loam 2 inches thick. The subsoil is grayish brown and light brownish gray silt loam 13 inches thick. The upper 22 inches of the substratum is light brownish gray silt loam, and the lower part to a depth of 60 inches or more is grayish brown silty clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 10 inches.

This soil is used for nonirrigated farming and as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the moderate hazards of soil blowing and water erosion. Minimum tillage, contour cultivation, grassed waterways, and stubble mulch tillage reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. If this soil is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

66—Floweree silt loam, 4 to 8 percent slopes. This deep, well drained soil is on fans in the west-central and southwestern parts of the county. It formed in alluvium. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambeth, Yamac, Kremlin, and Chinook soils. The deep, well drained Yamac and Chinook soils are on fans. These soils are highly susceptible to soil blowing. The Cambeth and Kremlin soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Floweree soil has a surface layer of grayish brown silt loam 2 inches thick. The subsoil is mostly light brownish gray silt loam 13 inches thick. The upper 22 inches of the substratum is light brownish gray

silt loam, and the lower part to a depth of 60 inches or more is grayish brown silty clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 10 inches.

This soil is used for nonirrigated farming and as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the moderate hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. If this soil used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

67—Floweree-Cambeth silt loams, 2 to 8 percent slopes. This map unit is on uplands in the southwestern and west-central parts of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Floweree silt loam and 40 percent Cambeth silt loam. The Floweree soil is in swales and on fans and foot slopes. The Cambeth soil is on the foot slopes, sides, and tops of hills and on ridges.

Included in this unit are small areas of Busby, Yamac, Cabbart, and Yawdim soils. Included areas make up about 10 percent of the total acreage. The shallow, well drained Cabbart and Yawdim soils are on the tops of hills and ridges. They are droughty and are low in productivity. The Busby and Yamac soils are highly susceptible to soil blowing.

The Floweree soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown silt loam 2 inches thick. The subsoil is mostly light brownish gray silt loam 13 inches thick. The upper 22 inches of the substratum is light brownish gray silt loam, and the lower part to a depth of 60 inches or more is grayish brown silty clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. This soil is calcareous below a depth of 10 inches.

The Cambeth soil is moderately deep and well drained. It formed in material derived dominantly from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown silt loam 6 inches thick. The subsoil is mostly light yellowish brown silt loam 7 inches thick. The substratum to a depth of 35 inches is pale yellow silt loam. Below this to a depth of 60 inches or more are white, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 24 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 6 inches.

These soils are used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are well suited to nonirrigated crops. They are limited mainly by the moderate hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community on the Floweree soil produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation. On the Cambeth soil, the production is 1,600 pounds per acre in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—The Floweree soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Cambeth soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Floweree soil is limited by moderately slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. If this soil is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Cambeth soil is limited mainly by the slow permeability of the underlying sedimentary beds, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

68—Gerdrum clay loam, 0 to 8 percent slopes. This deep, well drained, salt- and sodium-affected soil is on fans and terraces in the western and northern parts of the county. It formed in alluvium. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Absher, Rominell, Creed, Yawdim, Adger, and Kremlin soils. The Absher soils are in small, shallow, barren depressional areas. These soils are moderately salt-affected and strongly sodium-affected and have a thin surface crust. These factors severely limit the emergence of seedlings and the penetration of roots and moisture. The Yawdim soils are on the sides and tops of ridges and hills. They are underlain by semiconsolidated shale at a depth of 10 to 20 inches and are droughty. The Adger soils are strongly salt- and sodium-affected. All of these soils are low in productivity. The Rominell, Creed, and Kremlin soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Gerdrum soil, where mixed to a depth of 7 inches, has a surface layer of light brownish gray clay loam. The upper 4 inches of the subsoil is light brownish gray clay, and the lower 9 inches is light brownish gray clay loam. The substratum to a depth of 60 inches or more is light brownish gray and pale olive clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 7 inches.

Most areas of this soil are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—If this soil is used for nonirrigated crops, it is limited by the content of salts and sodium, the hard

crust that forms on the surface following rainfall, and the hazards of soil blowing and water erosion. The salts and sodium reduce the availability of moisture and plant nutrients and restrict the penetration of roots into the subsoil. The hard surface crust reduces the percentage of seedlings that emerge. These factors limit crop yields. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate.

Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, big sagebrush, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling, scalping, contour furrowing, and subsoiling. Control of big sagebrush to reduce competition with desirable forage species is a suitable practice.

Windbreaks.—This soil is poorly suited to windbreaks. It is salt-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVe, nonirrigated. It is in Clay Pan range site, 10- to 14-inch precipitation zone.

69—Gerdrum clay loam, gullied, 8 to 15 percent slopes. This deep, well drained, salt- and sodium-affected soil is on fans in the western part of the county. It commonly is frequently dissected by gullies that are 2 to 10 feet deep, as much as 5 feet wide, and 100 to 500 feet apart. They are caused by the concentrated flow of water that runs in from adjacent higher-lying areas. The soil formed in alluvium. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Yamac, Chinook, and Absher soils and shale outcroppings. The areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of shale outcroppings limit the range production of the unit.

Typically, this Gerdrum soil, where mixed to a depth of 7 inches, has a surface layer of light brownish gray clay loam. The upper 4 inches of the subsoil is light brownish gray clay, and the lower 9 inches is light brownish gray clay loam. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 7 inches.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because the many deep, narrow gullies make tillage difficult.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. The many gullies make seeding and mechanical treatment difficult.

Windbreaks.—This soil is poorly suited to windbreaks. It is salt-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, low soil strength, and the many gullies that limit access. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIe, nonirrigated. It is in Clay Pan range site, 10- to 14-inch precipitation zone.

70—Gerdrum-Absher clay loams, 0 to 8 percent slopes. This map unit is on fans and terraces in the western and northern parts of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Gerdrum clay loam and 40 percent Absher clay loam. The Absher soil is in small depressional areas surrounded by the Gerdrum soil.

Included in this unit are small areas of Weingart, Rominell, Yawdim, and Fleak soils. Included areas make up about 20 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Gerdrum soil is deep and well drained and is salt- and sodium-affected. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is light brownish gray clay loam. The upper 4 inches of the subsoil is light brownish gray clay, and the lower 9 inches is light brownish gray clay loam. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 7 inches.

The Absher soil is deep and well drained and is moderately salt-affected and strongly sodium-affected. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is grayish brown clay loam. A thin crust is on the surface. The subsoil is mostly light brownish gray clay loam and clay 20 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is moderately salt-affected and strongly sodium-affected at a depth of about 5 inches.

These soils are used as rangeland.

Cropland.—These soils are poorly suited to cultivated crops because of the content of salts and sodium in the subsoil. The salts and sodium reduce the availability of moisture and plant nutrients and restrict the penetration of roots and moisture into the subsoil. These characteristics drastically limit crop yields.

Rangeland.—The potential native plant community on the Gerdrum soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Absher soil is mainly western wheatgrass, green needlegrass, Montana wheatgrass, winterfat, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, Sandberg bluegrass, other perennial short grasses, perennial forbs, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as contour furrowing and scalping.

Windbreaks.—These soils are poorly suited to windbreaks. They are salt-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by slow and very slow permeability, shrink-swell potential,

and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If these soils are used for septic tank absorption fields, the limitation of slow and very slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIs, nonirrigated. The Gerdrum soil is in Clay Pan range site, 10- to 14-inch precipitation zone, and the Absher soil is in Dense Clay range site, 10- to 14-inch precipitation zone.

71—Gerdrum-Yawdim-Fleak complex, 0 to 8 percent slopes. This map unit is on uplands in the western part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 30 percent Gerdrum clay loam, 25 percent Yawdim silty clay, and 20 percent Fleak loamy sand. The nearly level to gently sloping Gerdrum soil is on fans between the gently sloping to moderately sloping Yawdim and Fleak soils on low hills.

Included in this unit are small areas of Absher, Neldore, Busby, and Yamac soils. Also included are small areas of shale and sandstone outcroppings and soils that have slopes of more than 8 percent. Included areas make up about 25 percent of the total acreage. The areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of shale and sandstone outcroppings limit the range production on the unit.

The Gerdrum soil is deep, well drained, and salt- and sodium-affected. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is light brownish gray clay loam. The upper 4 inches of the subsoil is light brownish gray clay, and the lower 9 inches is light brownish gray clay loam. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 7 inches.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is droughty.

The Fleak soil is shallow and somewhat excessively drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer, where mixed to a depth of 7 inches, is olive brown loamy sand. The underlying material to a depth of 16 inches is olive loamy sand. Below this to a depth of 60 inches or more are mostly light olive brown, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. The soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are poorly suited to cultivated crops because of the hazards of soil blowing and water erosion, the shallow depth and droughtiness of the Yawdim and Fleak soils, and the content of salts and sodium in the Gerdrum soil.

Rangeland.—The potential native plant community on the Gerdrum soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade.

The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

The potential native plant community on the Fleak soil is mainly prairie sandreed, little bluestem, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, yucca, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. These soils are poorly suited to practices such as chiseling and scalping because they are susceptible to soil blowing and water erosion if they are disturbed.

Windbreaks.—The Yawdim and Fleak soils are very poorly suited to windbreaks. They are limited mainly by the very low available water capacity.

The Gerdrum soil is poorly suited to windbreaks. It is salt-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—The Gerdrum soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Yawdim soil is poorly suited to homesite development. It is limited mainly by low soil strength, shrink-swell potential, shallow depth to semiconsolidated shale, and slow permeability. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. This soil is poorly suited to septic tank absorption fields because of the slow permeability and shallow depth to semiconsolidated shale. Shrinking and swelling, low soil strength, and shallow depth to semiconsolidated shale can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Fleak soil is suited to homesite development. It has few limitations. Deep cuts needed to provide nearly level road surfaces can expose sedimentary beds that can easily be excavated.

This map unit is in capability subclass VIs, nonirrigated. The Gerdrum soil is in Clay Pan range site, 10- to 14-inch precipitation zone; the Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone; and the Fleak soil is in Shallow range site, 10- to 14-inch precipitation zone.

72—Gerdrum-Yawdim-Fleak complex, 8 to 45 percent slopes. This map unit is on uplands in the western part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 25 percent Gerdrum clay loam, 25 percent Yawdim silty clay, and 25 percent Fleak loamy sand. The strongly sloping Gerdrum soil is on fans. The moderately steep and steep Yawdim and Fleak soils are on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Neldore, Vanda, and Absher soils. Also included are small areas of shale and sandstone outcroppings. Included areas make up about 25 percent of the total acreage. The areas of soils do not adversely affect the use and management of this unit as rangeland. The areas of shale and sandstone outcroppings limit the range production on the unit.

The Gerdrum soil is deep and well drained and is salt- and sodium-affected. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is light brownish gray clay loam. The upper 4 inches of the subsoil is light brownish gray clay, and the lower 9 inches is light brownish gray clay loam. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is moderate, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 7 inches.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray, semiconsolidated

shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid to very rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. The soil is droughty.

The Fleak soil is shallow and somewhat excessively drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer, where mixed to a depth of 7 inches, is olive brown loamy sand. The underlying material to a depth of 16 inches is mostly olive loamy sand. Below this to a depth of 60 inches or more are mostly light olive brown, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. The soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are poorly suited to cultivated crops because the Yawdim and Fleak soils are steep, shallow, and droughty and because the Gerdrum soil is salt- and sodium-affected.

Rangeland.—The potential native plant community on the Gerdrum soil is mainly western wheatgrass, thickspike wheatgrass, green needlegrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, perennial forbs, and fringed sagewort increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,100 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Fleak soil is mainly prairie sandreed, little bluestem, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and plains muhly decreases and the proportion of needleandthread, upland sedges, perennial short grasses, yucca, perennial forbs, and fringed sagewort increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Use of mechanical treatment practices is not practical.

Windbreaks.—The Yawdim and Fleak soils are not suited to windbreaks. They are limited mainly by their very low available water capacity and steepness of slope.

The Gerdrum soil is poorly suited to windbreaks. It is salt-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—The Gerdrum soil is poorly suited to homesite development. It is limited mainly by slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Yawdim and Fleak soils are poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Gerdrum soil is in Clay Pan range site, 10- to 14-inch precipitation zone; the Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone; and the Fleak soil is in Shallow range site, 10- to 14-inch precipitation zone.

73—Glendive sandy loam. This deep, well drained soil is on low terraces and flood plains of Prairie Elk Creek. The soil is in the north-central part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Hanly and Havre soils and Typic Fluvaquents. Also included are small areas of soils on short, steep slopes along terrace edges. The Hanly soils are occasionally flooded and are droughty. The Typic Fluvaquents are along streams and are frequently flooded. The areas of soils on short, steep slopes can be farmed around. The Havre soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Glendive soil has a surface layer of grayish brown sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is grayish brown and white sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to rare periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown.

Cropland.—This soil is suited to nonirrigated and irrigated crops. It is limited mainly by moderate available water capacity and the hazards of soil blowing and flooding. The hazard of soil blowing is a serious management concern. The abrasive effect of the moving sand grains can damage seedlings. Timely tillage is critical because adequate moisture is needed in the surface layer to form clods that reduce soil blowing while the fields are nearly barren. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce soil blowing. Planting may need to be delayed because of flooding.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Because the soil is droughty, light and frequent applications of irrigation water are needed. Leveling is needed in some areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, thickspike wheatgrass, and silver sagebrush increases. If excessive grazing continues, plants such as red threeawn, Kentucky bluegrass, annuals, and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Forage yields on this soil generally can be increased by the use of water spreading.

Windbreaks.—This soil is well suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIe, nonirrigated, and IIs, irrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

74—Glendive loam. This deep, well drained soil is on low terraces and flood plains of the Missouri River and its tributaries. The soil is in the western part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Hanly and Havre soils and Typic Fluvaquents. Also included are small areas of soils on short, steep slopes along terrace edges. The Hanly soils are occasionally flooded and are droughty. The Typic Fluvaquents are along streams and are frequently flooded. The areas of soils on short, steep slopes can be farmed around. The Havre soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Glendive soil has a surface layer of grayish brown loam 6 inches thick. The underlying material to a depth of 60 inches or more is grayish brown fine sandy loam stratified with thin lenses of loamy fine sand.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is subject to rare periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by moderate available water capacity, the hazard of soil blowing, and the possibility of flooding. Crops respond to nitrogen and phosphorus fertilizer. Because of droughtiness, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce soil blowing. Flooding may delay planting.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Because the soil is droughty, light and frequent applications of irrigation water are needed. Leveling is needed in some areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, big bluestem, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Forage yields on this soil generally can be increased by the use of water spreading.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIe, nonirrigated, and IIs, irrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

75—Glendive loam, protected. This deep, well drained soil is on high terraces along the Missouri River. The soil is in the northern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Harlem soils, Glendive silty clay loam, and Havre soils. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Glendive soil has a surface layer of grayish brown loam 6 inches thick. The underlying material to a depth of 60 inches or more is grayish brown fine sandy loam stratified with thin lenses of loamy fine sand.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is protected from flooding by Fort Peck Dam.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by moderate available water capacity and the hazard of soil blowing. Crops respond to nitrogen and phosphorus fertilizer. Because of the droughtiness of the soil, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and control soil blowing.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Because the soil is droughty, light and frequent applications of irrigation water are needed. Leveling is needed in some areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, and big bluestem. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and silver sagebrush increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. In places, control of silver sagebrush improves production of desirable forage plants.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitation for timber management is the difficulty of reestablishing stands of plains cottonwood. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclasses IIIe, nonirrigated, and IIs, irrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

76—Glendive silty clay loam. This deep, well drained soil is on low terraces and flood plains of the Missouri River and its tributaries. The soil is in the northwestern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havre and Harlem soils and Typic Fluvaquents. The Typic Fluvaquents are along streams and are frequently flooded. The Havre and Harlem soils do not adversely affect the use and management of this unit for nonirrigated and irrigated farming and as rangeland.

Typically, this Glendive soil has a surface layer of grayish brown silty clay loam 6 inches thick. The upper 15 inches of the underlying material is grayish brown loamy fine sand, and the lower part to a depth of 60 inches or more is grayish brown, stratified sandy loam and loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is subject to rare periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the texture of the surface layer, the hazard of soil blowing, and the possibility of flooding. The soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. Leaving crop residue on or near the surface conserves moisture, increases the water intake rate, and improves tilth. Flooding may delay planting.

Furrow, border corrugation, and sprinkler irrigation systems are suited to this soil. Because of the slow water intake rate of the soil, water should be applied at a slow rate over a long period to insure that the root zone is properly wetted. This should be considered when designing irrigation systems.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, Kentucky bluegrass, and thistles may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling, contour furrowing, or scalping. Control of silver sagebrush reduces its competition with desirable forage plants.

Forage yields generally can be increased by the use of water spreading.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIe, nonirrigated, and IIs, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

77—Glendive silty clay loam, protected. This deep, well drained soil is on high terraces of the Missouri River. The soil is in the northwestern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havre, Harlem, and Glendive soils. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Glendive soil has a surface layer of grayish brown silty clay loam 6 inches thick. The upper 15 inches of the underlying material is grayish brown loamy fine sand, and the lower part to a depth of 60 inches or more is grayish brown, stratified sandy loam and loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is protected from flooding by Fort Peck Dam.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the silty clay loam surface layer and the hazard of soil blowing. The soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. Leaving crop residue on or near the surface conserves moisture, increases the water intake rate, and improves tilth.

This soil is suited to irrigated crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Because of the slow water intake rate of the soil, water should be applied at a slow rate over a long period to insure that the root zone is properly wetted. This should be considered when designing irrigation systems.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, silver sagebrush, and fringed sagewort increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Control of silver sagebrush reduces its competition with desirable forage plants.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and the susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

The soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on areas of rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common

chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclasses IIIe, nonirrigated, and IIs, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

78—Glendive-Hanly complex, protected. This map unit is on high terraces of the Missouri River. The unit is in the northwestern part of the county. Slope is 0 to 2 percent. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Glendive sandy loam and 35 percent Hanly loamy fine sand. The unit has a hummocky topography. The Hanly soil is in higher areas, and the Glendive soil is in swales.

Included in this unit are small areas of Harlem and Havre soils. Included areas make up about 20 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland and for irrigated farming.

The Glendive soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is stratified, grayish brown and white sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is protected from flooding by Fort Peck Dam.

The Hanly soil is deep and somewhat excessively drained. It formed in sandy alluvium. Typically, the surface layer is grayish brown loamy fine sand 4 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loamy fine sand.

Permeability is rapid, and available water capacity is low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is droughty. It is protected from flooding by Fort Peck Dam.

These soils are used as rangeland and for irrigated farming. The main irrigated crops are wheat, oats, barley, and alfalfa hay. The soils are poorly suited to nonirrigated crops because of the high hazard of soil blowing and droughtiness.

Cropland.—These soils are suited to irrigated crops. In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soils. Leveling is needed in some areas for the efficient application and removal of irrigation water. Because the soils are droughty, light and frequent applications of irrigation water are needed. Keeping a cover crop of grasses or legumes on these soils during the nonirrigation season reduces soil blowing.

Rangeland.—The potential native plant community on the Glendive soil is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Hanly soil is mainly sand bluestem, prairie sandreed, Indian ricegrass, little bluestem, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, sand dropseed, blue grama, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Seeding of native plants is an acceptable practice. These soils are not suited to practices such as shallow chiseling and scalping because they are extremely droughty and are more susceptible to soil blowing and water erosion if they are disturbed. Reestablishing plant cover is difficult.

Windbreaks.—The Glendive soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

The Hanly soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Woodland.—The Glendive soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The Hanly soil is suited to plains cottonwood. The site index for plains cottonwood is 60. The potential annual production (CMAI) per acre is about 25 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitation for timber management on these soils is the difficulty of reestablishing plains cottonwood. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water.

Where these soils are forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are prairie sandreed, Canada wildrye, slender wheatgrass, common chokecherry, snowberry, Woods rose, field horsetail, green ash, Rocky Mountain juniper, poison-ivy, American licorice, and western meadowrue.

Homesite development.—These soils are well suited to homesite development. They have few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Effluent from septic tank absorption fields can seep into ground water and thus create a hazard to health.

This map unit is in capability subclasses VIe, nonirrigated, and IVe, irrigated. The Glendive soil is in Sandy range site, 10- to 14-inch precipitation zone, and the Hanly soil is in Sands range site, 10- to 14-inch precipitation zone.

79—Hanly loamy fine sand. This deep, somewhat excessively drained soil is on low terraces and flood plains of the Missouri River and its tributaries. The soil is in the northwestern part of the county. It formed in sandy alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Glendive and Havre soils and Typic Fluvaquents. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Hanly soil has a surface layer of grayish brown loamy fine sand 4 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loamy fine sand.

Permeability is rapid, and available water capacity is low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is droughty. It is subject to occasional periods of flooding during prolonged, high intensity storms and when ice jams the creeks during the spring runoff period. Channeling and deposition are common along streambanks.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because of occasional flooding, droughtiness, and the hazard of soil blowing.

Rangeland.—The potential native plant community is mainly sand bluestem, prairie sandreed, Indian ricegrass, little bluestem, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, sand dropseed, blue grama, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Seeding of native plants is an acceptable practice. This soil is not suited to practices such as shallow chiseling and scalping because it is extremely droughty and is more susceptible to soil blowing and water erosion if it is disturbed. Reestablishing plant cover is difficult.

Windbreaks.—This soil is poorly suited to windbreaks because of the low available water capacity and the hazard of soil blowing. The low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and the hazard of flooding. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Water erosion is a hazard on this soil if it is disturbed.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are prairie sandreed, Canada wildrye, slender wheatgrass, common chokecherry, snowberry, Woods rose, field horsetail, Rocky Mountain juniper, poison-ivy, and American licorice.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of occasional flooding.

This map unit is in capability subclass VIw, nonirrigated. It is in Sands range site, 10- to 14-inch precipitation zone.

80—Harlem silty clay. This deep, well drained soil is on low terraces and flood plains of the Missouri River and its tributaries. The soil is in the western part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havre and Dimmick soils. The Dimmick soils are in oxbows and depressional areas. They are not suited to cultivation because of wetness. The Havre soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Harlem soil has a surface layer of grayish brown silty clay 5 inches thick. The upper 18 inches of the underlying material is light brownish gray silty clay, and the lower part to a depth of 60 inches or more is grayish brown silty clay stratified with thin lenses of silt loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is subject to rare periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the silty clay texture of the surface layer, the hazard of soil blowing, and the possibility of flooding. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. This soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. Flooding may delay planting.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. Water should be applied at a slow rate over a long period to insure that the root zone is properly wetted.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,400 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling or scalping. Control of silver sagebrush reduces its competition with desirable forage plants.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclass IIIs, nonirrigated and irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

81—Harlem silty clay, protected. This deep, well drained soil is on high terraces of the Missouri River. The soil is in the northwestern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havre and Dimmick soils. The Dimmick soils are in oxbows and depressional areas. They are not suited to cultivated crops because of wetness. The Havre soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Harlem soil has a surface layer of grayish brown silty clay 5 inches thick. The upper 18 inches of the underlying material is light brownish gray silty clay, and the lower part to a depth of 60 inches or more is grayish brown silty clay stratified with thin lenses of silt loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where

this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is protected from flooding by Fort Peck Dam.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the silty clay texture of the surface layer and the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. This soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. Water should be applied at a slow rate over a long period to insure that the root zone is properly wetted.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, silver sagebrush, and fringed sagewort increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. In places, control of silver sagebrush improves the production of desirable forage plants.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and the susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

The soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIs, nonirrigated and irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

82—Havre silt loam. This deep, well drained soil is on low terraces and flood plains of creeks in the western part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Harlem, Lonna, and Glendive soils. Also included are small areas of soils on short, steep slopes along terrace edges; these areas can be farmed around. The Harlem, Lonna, and Glendive soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Havre soil has a surface layer of light brownish gray silt loam 5 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray silt loam and thin strata of fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is subject to rare periods of flooding during prolonged, high intensity storms and during the spring runoff period.

This soil is used for nonirrigated and irrigated farming and as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the hazard of soil blowing and the possibility of flooding. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. The surface layer of the soil has low organic matter content. Crops respond well to the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Flooding may delay planting.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Leveling is needed in sloping areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, big bluestem, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, Kentucky bluegrass, thistles, and other weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Forage yields can be increased by the use of water spreading. If the plant cover is disturbed for seeding or by mechanical treatment, protection from flooding may be needed to control gullying and sheet erosion until the plant cover is sufficiently reestablished. To reduce competition with desirable forage plants, control of silver sagebrush is a suitable practice.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

83—Havre silt loam, protected. This deep, well drained soil is on high terraces along the Missouri River. The soil is in the northwestern part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Harlem and Glendive soils and Havre silty clay loam. These areas do not adversely affect the use and management of this unit as rangeland and for cropland.

Typically, this Havre soil has a surface layer of light brownish gray silt loam 5 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray silt loam and thin strata of fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is protected from flooding by Fort Peck Dam.

This soil is used for nonirrigated and irrigated farming and as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. The surface layer of this soil has low organic matter content. Crops respond well to the application of phosphorus and nitrogen. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Leveling is needed in some areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, big bluestem, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. If the soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

84—Havre silty clay loam. This deep, well drained soil is on low terraces and flood plains of the Missouri River and its tributaries. The soil is in the northwestern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Harlem silt loam, Glendive silt loam, and Havre silt loam. Also included are small areas of soils on short, steep slopes along terrace edges; these areas can be farmed around. The Harlem, Glendive, and Havre soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Havre soil has a surface layer of grayish brown silty clay loam 9 inches thick. The upper 16 inches of the underlying material is stratified grayish brown silty clay loam and fine sandy loam, and the lower part to a depth of 60 inches or more is stratified, light brownish gray fine sandy loam and silt loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is subject to rare periods of flooding during prolonged, high intensity storms and during the spring runoff.

This soil is used for nonirrigated and irrigated farming and as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the silty clay loam texture of the surface layer, the hazard of soil blowing, and the possibility of flooding. The soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. Leaving crop residue on or near the surface conserves moisture, increases the water intake rate, and improves tilth. Flooding may delay planting.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Because of the slow water intake rate of the soil, water should be applied at a slow rate over a long period to insure that the root zone is properly wetted. This should be considered when designing irrigation systems.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, Kentucky bluegrass, thistles, and other weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,400 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable

practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Forage yields can be increased by the use of water spreading. If the plant cover is disturbed for seeding or by mechanical treatment, protection from flooding may be needed to control gullying and sheet erosion until the plant cover is sufficiently reestablished. To reduce competition with desirable forage plants, control of silver sagebrush is a suitable practice.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 70. The potential annual production (CMAI) per acre is about 35 cubic feet or 180 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood, the hazard of flooding, and susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

The soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

85—Havre silty clay loam, protected. This deep, well drained soil is on high terraces along the Missouri River. The soil is in the northwestern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Harlem silt loam, Glendive silt loam, and Havre silt loam. Also included are small areas of soils on short, steep slopes along terrace edges; these areas can be farmed around. The Harlem, Glendive, and Havre soils do not adversely affect the use and management of this unit as rangeland and cropland.

Typically, this Havre soil has a surface layer of grayish brown silty clay loam 9 inches thick. The upper 16 inches of the underlying material is stratified, grayish brown silty clay loam and fine sandy loam, and the lower part to a depth of 60 inches or more is stratified, light brownish gray fine sandy loam to silt loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is protected from flooding by Fort Peck Dam.

This soil is used for nonirrigated and irrigated farming and as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the silty clay loam texture of the surface layer and the hazard of soil blowing. The soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. Leaving crop residue on or near the surface conserves moisture, increases the water intake rate, and improves tilth.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Because of the slow water intake rate of the soil, water should be applied at a slow rate over a long period to insure that the root zone is properly wetted. This should be considered when designing irrigation systems.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, Kentucky bluegrass, thistles, and other weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. To reduce competition with desirable forage plants, control of silver sagebrush is a suitable practice.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—The soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

The soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderate permeability and low soil strength. If the soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

86—Havrelon loam. This deep, well drained soil is on low terraces and flood plains of the Missouri and Redwater Rivers and their tributaries. The soil is in the eastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Trembles, Cherry, and Ridgelawn soils. Also included are small areas of soils on short, steep slopes along terrace edges; these areas can be farmed around. The Trembles, Cherry, and Ridgelawn soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Havrelon soil has a surface layer of pale brown loam 5 inches thick. The underlying material to a depth of 60 inches or more is pale brown very fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is subject to rare periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the hazard of soil blowing and the possibility of flooding. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. The surface layer of this soil has low organic content. Using green manure crops, barnyard manure, and crop residue increases organic matter content and fertility. Crops respond well to the application of phosphorus and nitrogen. Flooding may delay planting.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Leveling is needed in sloping areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, and big bluestem. If the range is excessively

grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and silver sagebrush increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. In places, control of silver sagebrush improves production of desirable forage plants.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 70. The potential annual production (CMAI) per acre is about 35 cubic feet or 180 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitation for timber management is the difficulty of reestablishing stands of plains cottonwood. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

87—Havrelon loam, protected. This deep, well drained soil is on high terraces of the Missouri River. The soil is in the northeastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Trembles soils. Also included are small areas of soils on short, steep slopes along terrace edges; these areas can be farmed around. The Trembles soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Havrelon soil has a surface layer of pale brown loam 5 inches thick. The underlying material to a depth of 60 inches or more is pale brown very fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is protected from flooding by Fort Peck Dam.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. The surface layer of this soil has low organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Crops respond well to the application of phosphorus and nitrogen.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Water should be applied at a slow rate over a long period to insure that the root zone is properly wetted. Leveling is needed in some areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, and big bluestem. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and silver sagebrush increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and

scalping. In places, control of silver sagebrush improves production of desirable forage plants.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood, the hazard of flooding, and susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. If the soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

88—Havrelon loam, saline. This deep, well drained, strongly salt-affected soil is on low terraces of creeks. The soil is in the northeastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Macar loam, saline; Alona loam; and Havrelon loam. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Havrelon soil has a surface layer of grayish brown loam 5 inches thick. The upper 10 inches of the underlying material is light brownish gray sandy loam, the next 31 inches is light brownish gray, stratified sandy loam and sandy clay, and the lower part to a depth of 60 inches or more is light brownish gray fine sandy loam.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is strongly salt-affected at a depth of about 2 inches. It is subject to occasional periods of flooding during prolonged, high intensity storms and during the spring runoff.

This soil is used as rangeland.

Cropland.—This soil is very poorly suited to cultivated crops because the high content of salts reduces plant germination and reduces the availability of water and plant nutrients. These factors limit crop yields.

Rangeland.—The potential native plant community is mainly alkali cordgrass, alkali sacaton, Nuttall alkaligrass, Nuttall saltbush, and tall sedges. If the range is excessively grazed, the proportion of these plants decreases and the proportion of western wheatgrass, inland saltgrass, and bottlebrush squirreltail increases. If excessive grazing continues, plants such as foxtail barley, annual saltbush, and other annuals and weedlike forbs may invade. The potential native plant community produces about 3,500 pounds per acre of air-dry vegetation in years of above-normal precipitation and 2,000 pounds in years of below-normal precipitation.

Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. With increased grazing use, this soil may become more salty and thus produce less forage. Only the more salt-tolerant plants will grow. This soil is not suited to rangeland seeding because of its high content of salts.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the high content of salts.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of occasional flooding.

This map unit is in capability subclass VIw, nonirrigated. It is in Saline Lowland range site, 10- to 14-inch precipitation zone.

89—Havrelon silty clay loam. This deep, well drained soil is on low terraces and flood plains of the Missouri

and Redwater Rivers and their tributaries. The soil is in the eastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Trembles loam, Cherry loam, and Havrelon loam. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Havrelon soil has a surface layer of light brownish gray silty clay loam 6 inches thick. The upper 13 inches of the underlying material is light brownish gray, stratified loam and silt loam, and the lower part to a depth of 60 inches or more is light brownish gray, stratified loam and silty clay.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is subject to rare periods of flooding during prolonged, high intensity storms and spring runoff.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the silty clay loam texture of the surface layer, the hazard of soil blowing, and the possibility of flooding. Cultivating or subjecting the soil to vehicular traffic when it is wet results in compaction and subsequent root damage. The surface layer of this soil is low in content of organic matter. Using green manure crops, barnyard manure, and crop residue increases organic matter content and fertility. Crops respond well to the application of phosphorus and nitrogen. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. Flooding may delay planting.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Water should be applied at a slow rate over a long period to insure that the root zone is properly wetted. Leveling is needed in some areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, silver sagebrush, and fringed sagewort increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Control of silver sagebrush reduces its competition with desirable forage plants.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 70. The potential annual production (CMAI) per acre is about 35 cubic feet or 180 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

This soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

90—Havrelon silty clay loam, protected. This deep, well drained soil is on high terraces of the Missouri River. The soil is in the northeastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to

2,100 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Trembles loam, Cherry loam, and Havrelon loam. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Havrelon soil has a surface layer of light brownish gray silty clay loam 6 inches thick. The upper 13 inches of the underlying material is light brownish gray, stratified loam and silt loam, and the lower part to a depth of 60 inches or more is light brownish gray, stratified loam and silty clay.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is protected from flooding by Fort Peck Dam.

This soil is used mainly for nonirrigated and irrigated farming. It is also used as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by the silty clay loam texture of the surface layer and the hazard of soil blowing. Cultivating or subjecting the soil to vehicular traffic when it is wet results in compaction and subsequent root damage. The surface layer of this soil has low organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Crops respond well to the application of phosphorus and nitrogen. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Water should be applied at a slow rate over a long period to insure that the root zone is properly wetted. Leveling is needed in sloping areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, silver sagebrush, and fringed sagewort increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Control of silver sagebrush reduces its competition with desirable forage plants.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

This soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If the soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill

material that is properly compacted can overcome these limitations.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

91—Hillon loam, 2 to 8 percent slopes. This deep, well drained soil is on the sides and tops of low hills in the northwestern part of the county. It formed in glacial till. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Telstad, Yamac, Thoeny, and Sunburst soils. The salt- and sodium-affected Thoeny soils are on fans and in swales. The salts and sodium reduce the availability of moisture and plant nutrients and restrict the penetration of roots and moisture into the subsoil. These characteristics limit crop yields. The Telstad, Yamac, and Sunburst soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Hillon soil has a surface layer of grayish brown loam 7 inches thick. The underlying material to a depth of 60 inches or more is mostly light gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. The surface layer of this soil is low in organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Crops respond well to the application of phosphorus and nitrogen.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability and low soil strength. If the soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

92—Hillon loam, 8 to 15 percent slopes. This deep, well drained soil is on the sides and tops of hills and ridges in the northwestern part of the county. It formed in glacial till. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Telstad, Yamac, Sunburst, Thoeny, and Yawdim soils. The shallow, well drained Yawdim soils are on the tops of ridges and hills. They are droughty and are low in productivity. The salt- and sodium-affected Thoeny soils are on fans and in swales. The salts and sodium reduce the availability of moisture and plant nutrients and restrict penetration of roots and moisture into the subsoil. These characteristics limit crop yields. The Telstad, Yamac, and Sunburst soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Hillon soil has a surface layer of grayish brown loam 7 inches thick. The underlying material to a depth of 60 inches or more is mostly light gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual

wetting depth is about 21 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion. The surface layer of this soil is low in organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility. Crops respond well to the application of phosphorus and nitrogen.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability and low soil strength. If the soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Slope is a concern in installing septic tank absorption lines. Absorption lines should be installed on the contour. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IVe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

93—Hillon loam, 15 to 45 percent slopes. This deep, well drained soil is on the sides and tops of ridges and hills in the northwestern part of the county. It formed in glacial till. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Yawdim, Thoeny, and Telstad soils and areas of sandstone and shale outcroppings. The areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of sandstone and shale outcroppings limit the range production on the unit.

Typically, this Hillon soil has a surface layer of grayish brown loam 5 inches thick. The underlying material to a depth of 60 inches or more is mostly light gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 18 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

This soil is used as rangeland. It is very poorly suited to cultivated crops because of steepness of slope.

Rangeland.—The potential native plant community is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and creeping juniper increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. This soil is very poorly suited to

rangeland seeding or mechanical treatment because of the steepness of slope.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the steepness of slope.

Homesite development.—This soil is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIe, nonirrigated. It is in Thin Silty range site, 10- to 14-inch precipitation zone.

94—Hillon-Badland complex, 15 to 45 percent slopes. This map unit is on uplands in the north-central part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 35 percent Hillon loam and 35 percent Badland. The hilly to steep Hillon soil is on the sides and tops of hills and ridges. Badland consists of steep to very steep areas on coulees, ridges, and escarpments.

Included in this unit are small areas of Yawdim, Absher, Gerdrum, and Vanda soils. Also included are small areas of soils that have slopes of less than 15 percent. Included areas make up about 30 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Hillon soil is deep and well drained. It formed in glacial till. Typically, the surface layer is grayish brown loam 5 inches thick. The underlying material to a depth of 60 inches or more is mostly light gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 18 inches. Runoff is medium to rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

Badland consists mainly of steep to very steep areas on barren and nearly barren escarpments, narrow ridges, and deeply entrenched coulees. These areas were formed by the active geologic erosion of weakly consolidated, sandy and silty sedimentary beds and semiconsolidated shale.

Runoff is rapid or very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is high.

This unit is used as rangeland.

Cropland.—This unit is not suited to cultivated crops because of the steepness of slope and the areas of Badland.

Rangeland.—The potential native plant community on the Hillon soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and creeping juniper increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited. The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Use of mechanical treatment practices is not practical.

Windbreaks.—This unit is not suited to windbreaks because of the steepness of slope and the large areas of Badland.

Homesite development.—This unit is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. It is in Thin Silty range site, 10- to 14-inch precipitation zone.

95—Hillon-Yamac-Fleak complex, 15 to 45 percent slopes. This map unit is on uplands in the northwestern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 30 percent Hillon loam, 30 percent Yamac loam, and 25 percent Fleak loamy sand. The hilly to steep Hillon soil is on the upper sides and tops of hills and ridges, the hilly to steep Yamac soil is on fans and lower side slopes, and the steep Fleak soil is on the tops of hills and ridges.

Included in this unit are small areas of Kremlin, Absher, and Busby soils and areas of sandstone outcroppings. Included areas make up about 15 percent of the total acreage. These areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of sandstone outcroppings limit the range production on the unit.

The Hillon soil is deep and well drained. It formed in glacial till. Typically, the surface layer is grayish brown loam 5 inches thick. The underlying material to a depth of 60 inches or more is mostly light gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 18 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Yamac soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 21 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Fleak soil is shallow and somewhat excessively drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer, where mixed to a depth of 7 inches, is olive brown loamy sand. The underlying material to a depth of 16 inches is mostly olive loamy sand. Below this to a depth of 60 inches or more are mostly light olive brown, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Hillon soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and creeping juniper increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

The potential native plant community on the Yamac soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

The potential native plant community on the Fleak soil is mainly prairie sandreed, little bluestem, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, yucca, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. These soils are not suited to rangeland seeding and mechanical treatment because of the steepness of slope.

Windbreaks.—These soils are not suited to windbreaks because of the steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Hillon and Yamac soils are in Thin Silty range site, 10- to 14-inch precipitation zone, and the Fleak soil is in Shallow range site, 10- to 14-inch precipitation zone.

96—Hoffmanville silty clay, protected. This deep, well drained soil is on high terraces along the Missouri River in the northern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havrelon, Lohler, and Trembles soils. The Havrelon and Trembles soils are susceptible to soil blowing. The Lohler soils do not adversely affect the use and management of this unit for nonirrigated and irrigated farming and as rangeland.

Typically, this Hoffmanville soil has a surface layer of grayish brown silty clay 5 inches thick. The upper 23 inches of the underlying material is grayish brown silty clay, and the lower part to a depth of 60 inches or more is light brownish gray loamy fine sand.

Permeability is slow to a depth of 28 inches and rapid below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 28 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is protected from flooding by Fort Peck Dam.

This soil is used mainly for nonirrigated and irrigated farming. It is also used as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and

barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is suited to nonirrigated and irrigated crops. It is limited mainly by slow permeability, the hazard of soil blowing, and the silty clay texture of the surface layer. The soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. Keeping tillage at a minimum not only maintains the tilth of the surface layer but also increases water infiltration and reduces the risk of erosion. Soil blowing can be reduced by planting crops in alternate strips and at right angles to the prevailing wind. The surface layer of this soil is low in organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil. Crops respond well to the application of phosphorus and nitrogen.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. Yields of hay and pasture crops can be increased by the use of water spreading. Because of the slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, silver sagebrush, and fringed sagewort increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. To reduce competition with desirable forage plants, control of silver sagebrush is a suitable practice.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

The soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. If the soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. If the soil is used as a base for roads, it can be mixed with the underlying porous material to increase its strength and stability.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

97—Kremlin loam, 0 to 4 percent slopes. This deep, well drained soil is on fans and terraces in the western part of the county. It formed in alluvium. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambeth, Evanston, and Chinook soils. The Chinook soils are on fans and in swales. They are highly susceptible to soil blowing if the ground cover is disturbed. The Cambeth and Evanston soils do not adversely affect the use and

management of this unit as rangeland and for nonirrigated farming.

Typically, this Kremlin soil has a surface layer mostly of dark grayish brown loam 6 inches thick. The subsoil is dark grayish brown and light-brownish gray loam 7 inches thick. The upper 5 inches of the substratum is pale brown loam, and the lower part to a depth of 60 inches or more is mostly light gray loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. If this soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

98—Kremlin loam, 4 to 8 percent slopes. This deep, well drained soil is on fans in the west-central part of the county. It formed in alluvium. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambeth, Chinook, Yamac, and Evanston soils. The Chinook and Yamac soils are on fans and foot slopes. They are highly susceptible to soil blowing. The Cambeth and Evanston soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Kremlin soil has a surface layer mostly of dark grayish brown loam 6 inches thick. The subsoil is mostly dark grayish brown loam 7 inches thick. The upper 5 inches of the substratum is pale brown loam, and the lower part to a depth of 60 inches or more is mostly light gray loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on

the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. If this soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch preciptation zone.

99—Lehr loam, 2 to 8 percent slopes. This deep, somewhat excessively drained soil is on terraces and outwash plains in the southeastern part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Shambo, Wabek, Lisk, and Macar soils. Also included are small areas of soils that have slopes or less than 2 percent. The Lisk and Macar soils are on terraces and fans. They are highly susceptible to soil blowing. The gravelly Wabek soils are on terrace edges. They are droughty and low in productivity. The Shambo soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated crops.

Typically, this Lehr soil has a surface layer of brown loam 4 inches thick. The subsoil is mostly pale brown loam 14 inches thick. The substratum to a depth of 60 inches or more is very pale brown very gravelly fine sand. Very gravelly fine sand is at a depth of 14 to 20 inches.

Permeabilty is moderately rapid to a depth of 18 inches and very rapid below this depth. Available water capacity is low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This soil is used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of water erosion and soil blowing and by droughtiness. Because of the droughtiness of the soil, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce the hazards of water erosion and soil blowing.

Rangeland.—The potential native plant community is mainly bluebunch wheatgrass, western wheatgrass, little bluestem, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, western wheatgrass, and little bluestem decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice.

Windbreaks.—This soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—This soil is well suited to homesite development. It has few limitations. Effluent from septic tank absorption fields may contaminate ground water because the soil is underlain by very gravelly fine sand at a depth of 14 to 20 inches.

This map unit is in capability subclass IVe, nonirrigated. It is in Shallow to Gravel range site, 10- to 14-inch precipitation zone.

100—Lisk sandy loam, 2 to 8 percent slopes. This deep, somewhat excessively drained soil is on fans and foot slopes and in swales in the eastern part of the county. It formed in eolian and alluvial material. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Tally, Macar, Dast, Bryant, and Cambert soils. The Dast and Cambert soils are on the sides and tops of low hills. They are underlain by weakly consolidated sedimentary beds at a depth of 20 to 40 inches, which limit rooting depth. The Tally, Macar, and Bryant soils do not adversely affect the

use and management of this unit as rangeland and for nonirrigated crops.

Typically, the Lisk soil has a surface layer of grayish brown sandy loam 5 inches thick. The subsoil is light brownish gray sandy loam 10 inches thick. The upper 26 inches of the substratum is pale olive sandy loam, and the lower part to a depth of 60 inches or more is light gray loamy sand.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This soil is used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

*Cropland.*This soil is well suited to nonirrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. Tall grass barriers also trap snow, which increases the amount of moisture in the soil.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, needleandthread, and winterfat. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and winterfat decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and silver sagebrush increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crapapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

101—Lisk sandy loam, 8 to 15 percent slopes. This deep, somewhat excessively drained soil is on side slopes and fans in the east-central and northeastern parts of the county. It formed in eolian and alluvial material. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Tally, Macar, Dast, and Cabba soils. The Dast and Cabba soils are on the upper side slopes and tops of hills and ridges. The Cabba soils are shallow, and the Dast soils are moderately deep to weakly consolidated sedimentary beds, which limit rooting depth. The Tally and Macar soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated crops.

Typically, this Lisk soil has a surface layer of grayish brown sandy loam 5 inches thick. The subsoil is light brownish gray sandy loam 10 inches thick. The upper 26 inches of the substratum is pale olive sandy loam, and the lower part to a depth of 60 inches or more is light gray loamy sand.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This soil is used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increase the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, needleandthread, and winterfat. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, big bluestem, and winterfat decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and silver sagebrush increases. If excessive grazing continues, plants such as red threeawn, annuals, and weedlike forms may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—This soil is well suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—This soil is suited to homesite development. Slope is the main limitation and is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

102—Lohler silty clay loam, protected. This deep, moderately well drained soil is on high terraces along the Missouri River. The soil is in the northeastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Hoffmanville, Havrelon, and Trembles soils. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Lohler soil has a surface layer of dark grayish brown silty clay loam 6 inches thick. The upper 29 inches of the underlying material is grayish brown, stratified silty clay and silty clay loam, and the lower part to a depth of 60 inches or more is grayish brown silty clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It has a water table at a depth of 4 to 6 feet during the irrigation season. The soil is protected from flooding by Fort Peck Dam.

This soil is used mainly for nonirrigated or irrigated farming. It is also used as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is suited to nonirrigated and irrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. Crops respond to nitrogen and phosphorus fertilizer.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, silver sagebrush, and fringed sagewort increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes ia a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. To reduce competition with desirable forage plants, control of silver sagebrush is a suitable practice.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

The soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating

equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, silver buffaloberry, and starry false-Solomons-seal.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, low soil strength, shrink-swell potential, and wetness. Wetness can be reduced by installing drain tile around footings. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. The soil is poorly suited to septic tank absorption fields because of moderately slow permeability and wetness. Shrinking and swelling, low soil strength, and wetness can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclasses IIIs, nonirrigated, and IIs, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

103—Lohler silty clay. This deep, moderately well drained soil is on terraces and flood plains of the Missouri and Redwater Rivers. The soil is in the northeastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havrelon and Trembles soils. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Lohler soil has a surface layer of grayish brown silty clay 5 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray silty clay and thin strata of silt loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It has a water table at a depth of 4 to 6 feet during the irrigation season. The soil is subject to rare periods of floodng during prolonged, high intensity storms and during the spring runoff.

This soil is used mainly for nonirrigated and irrigated farming. It is also used as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is suited to nonirrigated and irrigated crops. It is limited mainly by the hazard of soil blowing and the silty clay texture of the surface layer. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. This soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as Kentucky bluegrass, annuals, and weedlike forms by invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,400 pounds in years of below-normal precipitation.

Rangeland seedling of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling or scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIs, nonirrigated, and IIs, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

104—Lohler silty clay, protected. This deep, moderately well drained soil is on high terraces of the Missouri River. The soil is in the northeastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation

is 1,900 to 2,100 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havrelon and Trembles soils. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Lohler soil has a surface layer of grayish brown silty clay 5 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray silty clay and thin strata of silt loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It has a water table at a depth of 4 to 6 feet during the irrigation season. The soil is protected from flooding by Fort Peck Dam.

This soil is used mainly for nonirrigated and irrigated farming. It is also used as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is suited to nonirrigated and irrigated crops. It is limited mainly by the hazard of soil blowing and the silty clay texture of the surface layer. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. This soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, silver sagebrush, and fringed sagewort increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. In places, control of silver sagebrush improves production of desirable forage plants.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitations for timber management are the difficulty of reestablishing stands of plains cottonwood and susceptibility of the soil to compaction. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

The soil has low strength when wet, which results in poor trafficability and the possibility of soil compaction when heavy equipment is used to yard logs. Operating equipment only when the soil is dry or frozen can overcome this limitation.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are western wheatgrass, green needlegrass, rose, snowberry, common chokecherry, prairie junegrass, poison-ivy, American licorice, green ash, Saskatoon serviceberry, redosier dogwood, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, shrink-swell potential, wetness, and low soil strength. Wetness can be reduced by installing drain tile around footings. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. The soil is poorly suited to septic tank absorption fields because of the moderately slow permeability and wetness. Shrinking and swelling, low soil strength, and wetness can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclasses IIIs, nonirrigated, and IIs, irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

105—Lonna silty clay loam, 0 to 4 percent slopes. This deep, well drained soil is on terraces and fans in the west-central and southwestern parts of the county. It formed in alluvium. Slopes are mainly 250 to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Alona, Floweree, Cambeth, and Havre soils. The moderately salt-affected and strongly sodium-affected Alona soils are on fans and terraces. The high content of salts and sodium reduces the availability of moisture and plant nutrients and restricts the penetration of roots and moisture. The Havre soils are subject to flooding during runoff in spring. The Floweree and Cambeth soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Lonna soil, where mixed to a depth of 7 inches, has a surface layer of brown silty clay loam. The subsoil is brown and very pale brown silty clay loam 9 inches thick. The substratum to a depth of 60 inches or more is very pale brown silt loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of water erosion and soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. Crops respond to phosphate and nitrogen fertilizer.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by low soil strength, shrink-swell potential, and moderate permeability. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

106—Lonna-Havre-Glendive complex, 0 to 2 percent slopes. This map unit is on terraces and flood plains along creeks in the western part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 25 percent Lonna silty clay loam, 25 percent Havre silt loam, and 25 percent Glendive sandy loam. The Havre and Glendive soils are on low terraces and flood plains, and the Lonna soil is on high terraces.

Included in this unit are small areas of Alona soils and Typic Fluvaquents, saline. Also included are small areas of soils on short, steep slopes along terrace edges. Included areas make up about 25 percent of the total acreage. The moderately salt-affected and strongly sodium-affected Alona soils are on terraces. The high content of salts and sodium reduces the availability of moisture and plant nutrients and restricts the penetration of roots and moisture. Typic Fluvaquents, saline, are in stream channels. They are wet, are highly saline, and are subject to occasional flooding.

The Lonna soil is deep and well drained. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is brown silty clay loam. The subsoil is brown and very pale brown silty clay loam 9 inches thick. The substratum to a depth of 60 inches or more is very pale brown silt loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is calcareous throughout.

The Havre soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray silt loam 5 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray silt loam and thin strata of fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is calcareous throughout. It is subject to occasional periods of flooding during prolonged, high intensity storms and during the spring runoff.

The Glendive soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is stratified, grayish brown loam and white sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is calcareous below a depth of 6 inches. It is subject to occasional periods of flooding during prolonged, high intensity storms and during the spring runoff.

These soils are used for nonirrigated and irrigated farming and as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown.

Cropland.—These soils are suited to nonirrigated and irrigated crops. They are limited mainly by the hazard of soil blowing and by the hazard of occasional flooding on the Glendive and Havre soils. The surface layer of these soils is low in organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of these soils. Crops respond well to the application of phosphorus and nitrogen. Flooding may delay planting. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Rangeland.—The potential native plant community on the Lonna soil is mainly western wheatgrass, green needlegrass, little bluestem, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, silver sagebrush, and fringed sagewort increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The potential native plant community on the Havre soil is mainly western wheatgrass, green needlegrass, little bluestem, big bluestem, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The potential native plant community on the Glendive soil is mainly prairie sandreed, little bluestem, big bluestem, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of thickspike wheatgrass, needleandthread, perennial short grasses, and silver sagebrush increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. If the plant cover is disturbed for seeding or mechanical treatment, protection from flooding may be needed to control gullying and sheet erosion until the plant cover is sufficiently reestablished. Brush control to reduce competition with desirable forage plants is a suitable practice. Forage yields on the Havre and Glendive soils can be increased by the use of water spreading.

Windbreaks.—The Lonna soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Havre soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn,

and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

The Glendive soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—These soils are poorly suited to homesite development. The Lonna soil is limited mainly by low soil strength, shrink-swell potential, and moderate permeability. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Havre and Glendive soils are limited for homesite development by the hazard of occasional flooding during runoff in spring.

This map unit is in capability subclasses IIIw, nonirrigated and irrigated. The Lonna and Havre soils are in Silty range site, 10- to 14-inch precipitation zone, and the Glendive soil is in Sandy range site, 10- to 14-inch precipitation zone.

107—Macar loam, 0 to 4 percent slopes. This deep, well drained soil is on fans and terraces in the eastern part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambert, Lisk, Barkof, and Cherry soils. The moderately deep Cambert and Barkof soils are underlain by root-limiting material at a depth of 20 to 40 inches. The Lisk and Cherry soils do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Macar soil has a surface layer of brown loam 3 inches thick. The subsoil is brown and pale brown loam 13 inches thick. The upper 18 inches of the substratum is light gray and light brownish gray loam, and the lower part to a depth of 60 inches or more is light brownish gray and light yellowish brown fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to cultivated crops. It is limited mainly by the hazards of water erosion and soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. Crops respond to nitrogen and phosphorus fertilizer.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite developmant.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. If the soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

108—Macar loam, 4 to 8 percent slopes. This deep, well drained soil is on fans in the eastern part of the county. It formed in alluvium. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Lisk, Dast, Cambert, Barkof, and Zahill soils. The Dast, Cambert, and Barkof soils are on the sides and tops of low hills. They have root-limiting material at a depth of 20 to 40 inches. The Lisk and Zahill soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Macar soil has a surface layer of brown loam 3 inches thick. The subsoil is mostly pale brown loam 13 inches thick. The upper 18 inches of the substratum is mostly light gray loam, and the lower part to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to cultivated crops. It is limited mainly by the hazards of water erosion and soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. The surface layer of the soil has low organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil. Crops respond well to the application of phosphorus and nitrogen.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. If the soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

109—Macar loam, 8 to 15 percent slopes. This deep, well drained soil is on fans and hillsides in the eastern part of the county. It formed in alluvium. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cabba, Dast, Barkof, and Zahill soils. The Dast and Barkof soils are on the upper side slopes and tops of hills. These soils are underlain by root-limiting material at a depth of 20 to 40 inches. The Cabba soils are on the tops of hills and ridges and are underlain by root-limiting material at a depth of 10 to 20 inches. The Zahill soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Macar soil has a surface layer of brown loam 3 inches thick. The subsoil is mostly pale brown loam 13 inches thick. The upper 18 inches of the substratum is mostly light gray loam, and the lower part to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to cultivated crops. It is limited mainly by the hazards of soil blowing and water

erosion. The surface layer of the soil has low organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil. Crops respond well to the application of phosphorus and nitrogen. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. If the soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IVe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

110—Macar loam, saline, 0 to 4 percent slopes. This deep, well drained, salt-affected soil is on fans and terraces in the northeastern part of the county. It formed in alluvium derived from glacial till. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Alona and Cherry soils and Havrelon soils, saline. The Alona and Havrelon soils are on terraces and fans. They are strongly salt- and sodium-affected. The salts and sodium reduce the availability of moisture and some plant nutrients, which limits crop yields. The Cherry soils do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Macar soil, where mixed to a depth of 7 inches, has a surface layer of grayish brown loam. The upper 8 inches of the subsoil is grayish brown silt loam, and the lower 5 inches is grayish brown loam. The substratum to a depth of 60 inches or more is mostly stratified, olive loam and silty clay loam.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is moderately salt-affected at a depth of about 7 inches. It is calcareous throughout.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is poorly suited to cultivated crops. It is limited mainly by the hazard of soil blowing, the content of salts, and the crusting of the surface. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, alkali bluegrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of inland saltgrass, needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical

treatment practices such as shallow chiseling, scalping, contour furrowing, and subsoiling.

Windbreaks.—This soil is suited to windbreaks. It is moderately salt-affected, however, which limits the choice of trees and shrubs to those that are salt-tolerant. Suitable trees for planting are Russian-olive, black hawthorn, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderate permeability and low soil strength. If the soil used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IVe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

111—Macar-Cabba loams, 8 to 15 percent slopes. This map unit is on hills and ridges in the eastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Macar loam and 35 percent Cabba loam. The Macar soil is on fans and the lower side slopes, and the Cabba soil is on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Dast, Barkof, Zahill, and Lisk soils. Included areas make up about 15 percent of the total acreage. The Dast and Barkof soils are on the upper side slopes and are underlain by root-limiting material at a depth of 20 to 40 inches. The Zahill and Lisk soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Macar soil is deep and well drained. It formed in alluvium. Typically, the surface layer is brown loam 3 inches thick. The subsoil is mostly pale brown loam 13 inches thick. The upper 18 inches of the substratum is mostly light gray loam, and the lower part to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used mainly as rangeland. They are also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are poorly suited to cultivated crops. They are limited mainly by the hazards of water erosion and soil blowing and by the droughtiness of the Cabba soil. The Cabba soil can be farmed around. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on the Macar soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, western wheatgrass, little bluestem, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, western wheatgrass, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal

precipitation and 700 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Macar soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Cabba soil is poorly suited to windbreaks. The very low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Macar soil is limited mainly by moderate permeability and low soil strength. If this soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

The Cabba soil is limited mainly by low soil strength and slow permeability of the underlying sedimentary beds. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds.

This map unit is in capability subclass IVe, nonirrigated. The Macar soil is in Silty range site, 10- to 14-inch precipitation zone, and the Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone.

112—Macar-Cambert loams, 2 to 8 percent slopes. This map unit is on hills and ridges in the east-central and southeastern parts of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Macar loam and 40 percent Cambert loam. The Macar soil is on fans and the lower side slopes of hills and ridges, and the Cambert soil is on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Dast, Barkof, and Shambo soils. Included areas make up about 20 percent of the total acreage. The Dast and Barkof soils are on the upper side slopes and tops of hills. They are underlain by root-limiting material at a depth of 20 to 40 inches. The Shambo soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Macar soil is deep and well drained. It formed in alluvium. Typically, the surface layer is brown loam 3 inches thick. The subsoil is mostly pale brown loam 13 inches thick. The upper 18 inches of the substratum is mostly light gray loam, and the lower part to a depth of 60 inches or more is mostly light brownish gray fine sandy loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Cambert soil is moderately deep and well drained. It formed in material derived from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown loam 4 inches thick. The subsoil is mostly brown loam 9 inches thick. The substratum to a depth of 26 inches is very pale brown silty clay loam. Below this to a depth of 60 inches or more are pale yellow and light gray, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

These soils are used for nonirrigated farming and as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to cultivated crops. They are limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community on these soils is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and

winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, red threeawn, and Kentucky bluegrass may invade. The potential native plant community on the Macar soil produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation. On the Cambert soil, it produces about 1,600 pounds per acre in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—These soils are suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Macar soil is limited mainly by moderate permeability and low soil strength. If this soil is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

The Cambert soil is limited mainly by low soil strength and slow permeability of the underlying sedimentary beds. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. Deep cuts needed to provide nearly level road surfaces can expose soft sedimentary beds that can easily be excavated. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

113—Marias clay. This deep, well drained soil is on fans and terraces in the central and northwestern parts of the county. It formed in clayey alluvium. Slope is 0 to 2 percent. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Marvan, Bascovy, and Harlem soils. The moderately salt- and sodium-affected Marvan soils are on fans. The content of salts and sodium reduces the availability of moisture and plant nutrients and restricts the penetration of roots and moisture into the subsoil. These characteristics limit crop yields. The moderately deep Bascovy soils are on the upper part of fans and on foot slopes. The consolidated shale that underlies these soils restricts penetration of roots. The Harlem soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated crops.

Typically, this Marias soil, where mixed to a depth of 7 inches, has a surface layer of grayish brown clay. The underlying material to a depth of 60 inches or more is grayish brown clay.

Permeability is very slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The soil is calcareous throughout.

This soil is used mainly as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing. Crops respond to nitrogen and phosphate fertilizer.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable

shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by very slow permeability, potential for shrinking and swelling, and low soil strength. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. The soil is poorly suited to septic tank absorption fields because of the very slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

114—Marvan clay, 0 to 8 percent slopes. This deep, well drained, salt- and sodium-affected soil is on fans and foot slopes in the northern part of the county. It formed in alluvium. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Vanda, Marias, and Gerdrum soils. The Vanda soils are on the upper parts of fans and foot slopes, below shale outcroppings. These soils are strongly salt- and sodium-affected, which reduces the penetration of roots and moisture and thus limits crop yields. The Marias and Gerdrum soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Marvan soil has a surface layer of grayish brown clay 4 inches thick. The upper 31 inches of the underlying material is grayish brown and olive clay, and the lower part to a depth of 60 inches or more is light yellowish brown silty clay loam and thin strata of silt loam and fine sandy loam.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout. It is moderately salt- and sodium-affected at a depth of about 4 inches.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is poorly suited to nonirrigated crops. It is limited mainly by the hazards of water erosion and soil blowing, the clay surface layer, and the salt- and sodium-affected underlying material.

This soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. The salts and sodium in the underlying material reduce the availability of moisture and restrict root penetration. Keeping tillage at a minimum not only helps to maintain the tilth of the surface layer but also increases water infiltration and reduces the risk of erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 950 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling, scalping, and contour furrowing.

Windbreaks.—This soil is suited to windbreaks. It is moderately salt-affected, which limits the choice of trees and shrubs to those that are salt-tolerant. Suitable trees for planting are Russian-olive, black hawthorn, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by the very slow permeability, shrink-swell potential, and low soil strength. Buildings can be designed to offset the effects of shrinking and swelling. The soil is poorly suited to septic tank absorption fields because of the very slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. Access roads should be designed to control surface runoff and help stabilize cut slopes.

This map unit is in capability subclass IVs, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

115—Neldore-Badland-Bascovy complex, 15 to 45 percent slopes. This map unit is on uplands in the

northwestern part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Neldore clay, 30 percent Badland, and 20 percent Bascovy silty clay. The steep Neldore soil is on the upper side slopes and tops of hills and ridges, and the moderately steep Bascovy soil is on side slopes and fans. The areas of Badland are on hills, ridges, escarpments, and side slopes of deep coulees.

Included in this unit are small areas of Sunburst, Vanda, and Yamac soils. Also included are small areas of soils that have slopes of less than 15 percent. Included areas make up about 10 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Neldore soil is shallow and well drained. It formed in material derived from consolidated shale. Typically, the surface layer is grayish brown clay 5 inches thick. The underlying material to a depth of 17 inches is grayish brown clay. Below this to a depth of 60 inches or more is olive gray consolidated shale. Consolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the consolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is droughty.

Badland consists of barren and nearly barren areas on the tops of hills and ridges, on escarpments, and in deeply entrenched coulees. These areas were formed by the active geologic erosion of consolidated shale. Runoff is very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is moderate.

The Bascovy soil is moderately deep and well drained. It formed in material derived from consolidated shale. Typically, the surface layer is grayish brown silty clay 2 inches thick. The subsoil is grayish brown silty clay 9 inches thick. The substratum to a depth of 23 inches is grayish brown silty clay. Below this to a depth of 60 inches or more is olive gray consolidated shale. Consolidated shale is at a depth of 20 to 40 inches.

Permeability is very slow, and available water capacity is low. Effective rooting depth is limited by the consolidated shale at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is droughty.

This unit is used as rangeland.

Cropland.—This soil is not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Neldore soil is mainly prairie sandreed, little bluestem, bluebunch wheatgrass, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of perennial short grasses, longleaf sagebrush, prairie rose, rubber rabbitbrush, and skunkbush sumac increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,100 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Bascovy soil is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of perennial short grasses, juniper, perennial forbs, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,300 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of this unit. Use of mechanical treatment practices is not practical. The soils in the unit are not suited to rangeland seeding because of the steepness of slope.

Windbreaks.—This unit is not suited to windbreaks because of the steepness of slope.

Homesite development.—This unit is poorly suited to homesite development because of the steepness of slope, the shallow depth to consolidated shale in the Neldore soil, the moderate depth to consolidated shale in the Bascovy soil, and the areas of Badland.

This map unit is in capability subclass VIIe, nonirrigated. The Neldore soil is in Coarse Clay range site, 10- to 14-inch precipitation zone, and the Bascovy soil is in Thin Clayey range site, 10- to 14-inch precipitation zone.

116—Neldore-Bascovy complex, 2 to 15 percent slopes. This map unit is on uplands, mostly in the northwestern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Neldore clay and 35 percent Bascovy silty clay. The gently sloping to strongly sloping Neldore soil is on the upper side slopes and tops of hills, and the gently sloping and moderately sloping Bascovy soil is on the foot slopes and side slopes of hills.

Included in this unit are small areas of Vanda and Sunburst soils and shale outcroppings. Included areas make up about 25 percent of the total acreage. The areas of soil do not adversely affect the use and

management of this unit as rangeland. The areas of shale outcroppings limit the range production of this unit.

The Neldore soil is shallow and well drained. It formed in material derived from consolidated shale. Typically, the surface layer is grayish brown clay 5 inches thick. The underlying material to a depth of 17 inches is grayish brown clay. Below this to a depth of 60 inches or more is olive gray consolidated shale. Consolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the consolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate to high. The hazard of soil blowing is moderate. This soil is droughty.

The Bascovy soil is moderately deep and well drained. It formed in material derived from consolidated shale. Typically, the surface layer is grayish brown silty clay 2 inches thick. The subsoil is grayish brown silty clay 9 inches thick. The substratum to a depth of 23 inches is grayish brown silty clay. Below this to a depth of 60 inches or more is olive gray consolidated shale. Consolidated shale is at a depth of 20 to 40 inches.

Permeability is very slow, and available water capacity is low. Effective rooting depth is limited by the consolidated shale at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high. The hazard of soil blowing is moderate. This soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are poorly suited to cultivated crops because of droughtiness and depth to consolidated shale, which limits rooting depth.

Rangeland.—The potential native plant community on the Neldore soil is mainly prairie sandreed, little bluestem, bluebunch wheatgrass, sun sedge, and western wheatgrass. If the range is excessively grazed, the proportion of these plants decreases and the proportion of perennial short grasses, longleaf sagebrush, prairie rose, rubber rabbitbrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,100 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Bascovy soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

These soils are poorly suited to mechanical treatment practices because they are droughty and are susceptible to soil blowing and water erosion if they are disturbed.

Windbreaks.—The Neldore soil is not suited to windbreaks. It is limited mainly by the very low available water capacity.

The Bascovy soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Neldore soil is limited mainly by slow permeability, shallow depth to consolidated shale, low soil strength, and shrink-swell potential. The Bascovy soil is limited mainly by very slow permeability, moderate depth to consolidated shale, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. These soils are poorly suited to septic tank absorption fields because of the slow and very slow permeability and restricted depth to consolidated shale. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. Access roads must be designed to control surface runoff and help stabilize cut slopes.

This map unit is in capability subclass VIs, nonirrigated. The Neldore soil is in Coarse Clay range site, 10- to 14-inch precipitation zone, and the Bascovy soil is in Clayey range site, 10- to 14-inch precipitation zone.

117—Neldore-Yamac-Badland complex, 15 to 45 percent slopes. This map unit is on uplands in the northwestern part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 35 percent Neldore clay, 30 percent Yamac loam, and 25 percent Badland. The moderately steep to steep Neldore soil is on the sides and tops of hills and ridges, the moderately steep Yamac soil is on terraces, and Badland is on the tops of hills and ridges, on escarpments, and in coulees.

Included in this unit are small areas of Bascovy, Sunburst, and Fleak soils. Also included are small areas of soils that have slopes of less than 15 percent.

Included areas make up about 10 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Neldore soil is shallow and well drained. It formed in material derived from consolidated shale. Typically, the surface layer is grayish brown clay 5 inches thick. The underlying material to a depth of 17 inches is grayish brown clay. Below this to a depth of 60 inches or more is olive gray consolidated shale. Consolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the consolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is droughty.

The Yamac soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 21 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

Badland consists of barren and nearly barren areas on the tops of hills and ridges, on escarpments, and in deeply entrenched coulees. These areas were formed by the active geologic erosion of consolidated shale. Runoff is very rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used as rangeland.

Cropland.—This soil is not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Neldore soil is mainly prairie sandreed, little bluestem, bluebunch wheatgrass, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of perennial short grasses, longleaf sagebrush, prairie rose, rubber rabbitbrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,100 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Yamac soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

Use of mechanical treatment practices is not practical on these soils. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas.

Windbreaks.—This unit is not suited to windbreaks because of the steepness of slope.

Homesite development.—This unit is poorly suited to homesite development because of the steepness of slope, the shallow depth to consolidated shale in the Neldore soil, and the areas of Badland.

This map unit is in capability subclass VIIe, nonirrigated. The Neldore soil is in Coarse Clay range site, 10- to 14-inch precipitation zone, and the Yamac soil is in Thin Silty range site, 10- to 14-inch precipitation zone.

118—Pendroy clay. This deep, well drained soil is in oxbows and depressional areas on terraces of the Missouri River, in the northern part of the county. It formed in clayey alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Harlem and Marias soils. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, the Pendroy soil has a surface layer of grayish brown clay 14 inches thick. The underlying material to a depth of 60 inches or more is grayish brown clay.

Permeability is very slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This soil is used mainly for nonirrigated and irrigated farming. It is also used as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown.

Cropland.—This soil is suited to nonirrigated and irrigated crops. It is limited mainly by very slow permeability and the clay texture of the soil. The soil is difficult to till when dry, and it is subject to clodding and compaction if it is tilled when wet. The content of soil moisture is optimum for tillage for only a short period. Keeping tillage at a minimum maintains tilth of the

surface layer, increases water infiltration, and reduces the risk of erosion.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. Yields of hay and pasture crops can be increased by the use of water spreading. Because of the very slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, annuals, and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,400 pounds in years of below-normal precipitation.

Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by very slow permeability, shrink-swell potential, and low soil strength. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. The soil is poorly suited to septic tank absorption fields because of the very slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVs, nonirrigated and irrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

119—Ridgelawn silt loam. This deep, well drained soil is on stream terraces and flood plains in the northeastern part of the county and along the Redwater River in the southeastern part. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havrelon, Trembles, and Banks soils. Also included are small areas of soils on short, steep slopes along terrace edges; these areas can be farmed around. The Havrelon, Trembles, and Banks soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Ridgelawn soil has a surface layer of light brownish gray silt loam 7 inches thick. The upper 17 inches of the underlying material is light brownish gray loam, and the lower part to a depth of 60 inches or more is grayish brown loamy fine sand.

Permeability is moderate to a depth of 24 inches and rapid below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is calcareous throughout. It is subject to rare periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks.

This soil is used as rangeland and for nonirrigated and irrigated farming. The main nonirrigated crops are wheat, oats, and barley. The main irrigated crops are wheat, oats, barley, and alfalfa hay.

Cropland.—This soil is suited to nonirrigated and irrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. Yields of hay and pasture crops can be increased by the use of water spreading. If a water spreading system is used in sloping areas, land leveling is needed for the efficient application and removal of water.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as Kentucky bluegrass, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in

years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. If the plant cover is disturbed for seeding or mechanical treatment, protection from flooding may be needed to control gullying and sheet erosion until the plant cover is sufficiently reestablished.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclasses IIIe, nonirrigated, and IIe, irrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

120—Rominell loam, 0 to 8 percent slopes. This deep, well drained, salt- and sodium-affected soil is on fans and terraces in the west-central and northern parts of the county. It formed in alluvium derived from sandstone and shale. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Kremlin, Gerdrum, Chinook, and Yawdim soils and Rominell soils, gullied. The nearly level to moderately sloping Rominell soils, gullied, are on fans and terraces. The many deep, narrow gullies make tillage difficult. The shallow, well drained Yawdim soils are on side slopes and on the tops of low hills. They are droughty and are low in productivity. The deep, well drained Chinook soils are on fans. They are highly susceptible to soil blowing. The Kremlin and Gerdrum soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Rominell soil has a surface layer of grayish brown loam 4 inches thick. The subsurface layer is light brownish gray fine sandy loam 5 inches thick. The upper 6 inches of the subsoil is light brownish gray clay loam, and the lower 10 inches is light olive brown loam. The upper 29 inches of the substratum is brown clay loam, and the lower part to a depth of 60 inches or more is light olive brown loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is moderately salt-affected and strongly sodium-affected at a depth of about 9 inches.

Most areas of this soil are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—If this soil is used for cultivated crops, it is limited mainly by the content of salts and sodium in the subsoil and the hazards of soil blowing and water erosion. The salt in the subsoil reduces the amount of moisture available for plant growth. Keeping tillage at a minimum helps to maintain tilth of the surface layer, increases water infiltration, and reduces the risk of erosion. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion, conserves moisture, and promotes aeration. Chiseling also improves soil tilth because it produces hard clods that are gradually broken down by successive freezing and thawing.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Control of big sagebrush to reduce its competition with desirable forage plants is a suitable practice.

Windbreaks.—This soil is poorly suited to windbreaks. It is salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill

material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVs, nonirrigated. It is in Clay Pan range site, 10- to 14-inch precipitation zone.

121—Rominell loam, gullied, 0 to 8 percent slopes. This deep, well drained, salt- and sodium-affected soil is on fans and terraces in the west-central and northern parts of the county. It is commonly dissected by gullies that are caused by the concentrated flow of water from adjacent higher-lying areas. They are 2 to 10 feet deep, as much as 5 feet wide, and 100 to 500 feet apart. The soil formed in alluvium derived from sandstone and shale. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Kremlin, Benz, and Yawdim soils and Chinook soils, gullied. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Rominell soil has a surface layer of grayish brown loam 4 inches thick. The subsurface layer is light brownish gray fine sandy loam 5 inches thick. The upper 6 inches of the subsoil is light brownish gray clay loam, and the lower 10 inches is light olive brown loam. The substratum to a depth of 60 inches or more is mostly brown clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is moderately salt-affected and strongly sodium-affected at a depth of about 9 inches.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because the many deep, narrow gullies make tillage difficult.

Rangeland.—The potential native plant community is mainly western wheatgrass, thickspike wheatgrass, green needlegrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. The many deep, narrow gullies make seeding and mechanical treatment difficult.

Windbreaks.—This soil is poorly suited to windbreaks. It is salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, low soil strength, and the many gullies, which limit access. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIe, nonirrigated. It is in Clay Pan range site, 10- to 14-inch precipitation zone.

122—Rominell-Yamac loams, 4 to 15 percent slopes. This map unit is on uplands in the west-central part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Rominell loam and 40 percent Yamac loam. The moderately sloping Rominell soil is on fans and in swales between low hills, and the moderately sloping to strongly sloping Yamac soil is on the sides and tops of hills.

Included in this unit are small areas of Kremlin, Fleak, and Yadim soils and Chinook soils, gullied. Included areas make up about 15 percent of the total acreage. The moderately sloping Chinook soils, gullied, are on fans. The deep, narrow gullies make tillage difficult. The shallow, well drained Fleak and Yawdim soils are on the tops of hills and ridges. They are droughty and are low in productivity. The Kremlin soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Rominell soil is deep and well drained and is salt- and sodium-affected. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The subsurface layer is light brownish gray fine sandy loam 5 inches thick. The upper 6 inches of the subsoil is light brownish gray clay loam, and the lower 10 inches is light olive brown loam. The substratum to a depth of 60 inches or more is mostly brown clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more.

Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is moderately salt-affected and strongly sodium-affected at a depth of about 9 inches.

The Yamac soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 21 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous throughout.

Most areas of these soils are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the content of salts and sodium in the subsoil of the Rominell soil and by the hazards of soil blowing and water erosion. The salts in the subsoil of the Rominell soil reduce the amount of moisture available for plant growth. Keeping tillage at a minimum not only maintains tilth of the surface layer but also increases water infiltration and reduces the risk of erosion. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion, conserves moisture, and promotes aeration. Chiseling also improves soil tilth because it produces hard clods that are gradually broken down by successive freezing and thawing.

Rangeland.—The potential native plant community on the Rominell soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Yamac soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and fringed sagewort increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted introduced grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Rominell soil is poorly suited to windbreaks. It is salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

The Yamac soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Rominell soil is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Yamac soil is limited mainly by moderate permeability and low soil strength. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IVs, nonirrigated. The Rominell soil is in Clay Pan range site, 10- to 14-inch precipitation zone, and the Yamac soil is in Silty range site, 10- to 14-inch precipitation zone.

123—Savage silty clay loam, 0 to 4 percent slopes. This deep, well drained soil is on terraces and fans in the northeastern part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is

about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Farland, Farnuf, and Cherry soils. The Cherry soils are highly susceptible to soil blowing. The Farland and Farnuf soils do not adversely affect the use and management of this unit for nonirrigated farming or as rangeland.

Typically, this Savage soil has a surface layer of grayish brown silty clay loam 7 inches thick. The upper 9 inches of the subsoil is dark grayish brown silty clay loam, and the lower 20 inches is grayish brown silty clay loam. The upper 7 inches of the substratum is light brownish gray silty clay loam, and the lower part to a depth of 60 inches or more is mostly light brownish gray silty clay.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate.

Most areas of this soil are used for nonirrigated farming. A few areas are used as rangeland. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, shrink-swell potential, and low soil strength. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. If the soil is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

124—Shambo loam, 0 to 4 percent slopes. This deep, well drained soil is on terraces and fans in the eastern part of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Macar, Tally, Cambert, and Bryant soils. The Tally soils are highly susceptible to soil blowing. The Cambert soils are moderately deep to weakly consolidated, silty sedimentary beds that limit rooting depth. The Macar and Bryant soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated crops.

Typically, this Shambo soil has a surface layer of grayish brown loam 4 inches thick. The upper 10 inches of the subsoil is brown loam, and the lower 8 inches is pale yellow loam. The substratum to a depth of 60 inches or more is light gray loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 14 inches.

This soil is used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and

grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability, low soil strength, and potential for shrinking and swelling. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

125—Shambo loam, 4 to 8 percent slopes. This deep, well drained soil is on fans and foot slopes of low hills in the eastern part of the county. It formed in alluvium. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Macar, Cambert, Tally, and Bryant soils. The Tally soils are highly susceptible to soil blowing. The Cambert soils are moderately deep to weakly consolidated sedimentary beds that limit rooting depth. The Macar and Bryant soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated crops.

Typically, this Shambo soil has a surface layer of grayish brown loam 4 inches thick. The upper 10 inches of the subsoil is brown loam, and the lower 8 inches is pale yellow loam. The substratum to a depth of 60 inches or more is light gray loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 14 inches.

Most areas of this soil are used for nonirrigated farming. A few areas are used as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability, low soil strength, and potential for shrinking and swelling. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate

drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

126—Shambo-Cabba loams, 8 to 15 percent slopes. This map unit is on uplands in the east-central and southeastern parts of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Shambo loam and 35 percent Cabba loam. The Shambo soil is on fans and foot slopes, and the Cabba soil is on the side slopes and tops of hills and ridges.

Included in this unit are small areas of Macar, Cambert, Tally, and Bryant soils. Included soils make up about 15 percent of the total acreage. The Macar and Tally soils are on fans and foot slopes. The Tally soils are highly susceptible to soil blowing. The Cambert soils are on hillsides. They are moderately deep to root-limiting, weakly consolidated sedimentary beds. The Macar and Bryant soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Shambo soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The upper 10 inches of the subsoil is brown loam, and the lower 8 inches is pale yellow loam. The substratum to a depth of 60 inches or more is light gray loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 14 inches.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion. The Cabba soil is also limited by droughtiness and the shallow depth to root-limiting sedimentary beds. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion. Subsoiling the Cabba soil increases its effective rooting depth.

Rangeland.—The potential native plant community on the Shambo soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, western wheatgrass, little bluestem, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, western wheatgrass, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Subsoiling the Cabba soil would improve its ability to respond to management. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Shambo soil is well suited to windbreaks. Suitable trees for planting are Russian-olive,

Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Cabba soil is suited to windbreaks, but the very low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Shambo soil is limited mainly by moderate permeability, low soil strength, and shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Cabba soil is limited for use as homesites mainly by low soil strength and slow permeability of the sedimentary beds. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the sedimentary beds. Deep cuts needed to provide nearly level road surfaces can expose soft sedimentary beds that can easily be excavated. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. The Shambo soil is in Silty range site, 10- to 14-inch precipitation zone, and the Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone.

127—Shambo-Cambert loams, 2 to 8 percent slopes. This map unit is on uplands in the eastern part of the county. Slopes are mainly 250 feet to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Shambo loam and 40 percent Cambert loam. The Shambo soil is on fans and foot slopes, and the Cambert soil is on the side slopes and tops of low hills.

Included in this unit are small areas of Dast, Barkof, Cabba, and Bryant soils. Included soils make up about 10 percent of the total acreage. The Dast, Barkof, and Cabba soils are on the side slopes and tops of low hills. The Dast soils are highly susceptible to soil blowing and are moderately deep to weakly consolidated, sandy sedimentary beds. The Barkof soils are moderately deep to semiconsolidated shale. The Cabba soils are highly susceptible to soil blowing and are shallow to weakly consolidated, sandy and silty sedimentary beds. All of these soils have limited rooting depth. The Bryant soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated crops.

The Shambo soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The upper 10 inches of the subsoil is brown loam, and the lower 8 inches is pale yellow loam. The substratum to a depth of 60 inches or more is light gray loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 14 inches.

The Cambert soil is moderately deep and well drained. It formed in material derived from weakly consolidated, silty sedimentary beds. Typically, the surface layer is brown loam 4 inches thick. The subsoil is mostly brown loam 9 inches thick. The substratum to a depth of 26 inches is very pale brown silty clay loam. Below this to a depth of 60 inches or more are pale yellow and light gray, weakly consolidated, silty sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderate, and available water capacity is moderate. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 9 inches.

These soils are used as rangeland and for nonirrigated crops. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion and by the moderate depth to sedimentary beds in the Cambert soil. These beds limit rooting depth. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on these soils is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and

winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community on the Shambo soil produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation. The potential native plant community on the Cambert soil produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Shambo soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Cambert soil is suited to windbreaks, but the limited moisture supply restricts the choice of trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. The Shambo soil is limited mainly by moderate permeability, low soil strength, and potential for shrinking and swelling. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Cambert soil is limited for use as homesites mainly by low soil strength and slow permeability of the underlying sedimentary beds. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the sedimentary beds. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

128—Sunburst clay loam, 2 to 8 percent slopes. This deep, well drained soil is on knolls and foot slopes of low hills in the northwestern part of the county. It formed in glacial till. Slopes are mainly 250 to 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Telstad, Yamac, Busby, and Thoeny soils. The Thoeny soils are in shallow depressional areas on fans and foot slopes. They have a moderately sodium-affected subsoil, which reduces the penetration of roots and moisture. This characteristic limits crop yields. The Telstad, Yamac, and Busby soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Sunburst soil has a surface layer of grayish brown clay loam 3 inches thick. The upper 16 inches of the underlying material is grayish brown silty clay loam, and the lower part to a depth of 60 inches or more is mostly grayish brown silty clay.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

Most areas of this soil are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the high hazard of soil blowing and the moderate hazard of water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. The surface layer of this soil is high in content of lime and low in content of organic matter. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil. Crops respond well to the application of phosphorus and nitrogen.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds

per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. Buildings can be designed to offset the effects of shrinking and swelling. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIe, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

129—Sunburst clay loam, 8 to 15 percent slopes. This deep, well drained soil is on the sides and tops of hills and ridges in the northwestern part of the county. It formed in glacial till. Slopes are mainly 250 to 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Telstad, Yamac, Busby, and Thoeny soils. The Thoeny soils are in shallow depressional areas on fans and foot slopes. They have a moderately sodium-affected subsoil, which reduces penetration by roots and moisture. This characteristic limits crop yields. The Telstad, Yamac, and Busby soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Sunburst soil has a surface layer of grayish brown clay loam 3 inches thick. The upper 16 inches of the underlying material is grayish brown silty clay loam, and the lower part to a depth of 60 inches or more is mostly grayish brown silty clay.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. The soil is calcareous throughout.

Most areas of this soil are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. The surface layer of this soil is high in content of lime and low in content of organic matter. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil. Crops respond well to the application of phosphorus and nitrogen.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling, scalping, and contour furrowing. All tillage should be on the contour or across the slope.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, shrink-swell potential, and low soil strength. Buildings can be designed to offset the effects of shrinking and swelling. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Shrinking and swelling and low soil strength can

adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. Access roads must be designed to provide adequate cut-slope grade, and drains must be used to control surface runoff and keep soil losses to a minimum.

This map unit is in capability subclass IVe, nonirrigated. It is in Clayey range site, 10- to 14-inch precipitation zone.

130—Sunburst clay loam, 15 to 45 percent slopes. This deep, well drained soil is on the sides and tops of ridges and hills in the northwestern part of the county. It formed in glacial till. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Fleak, Bascovy, and Busby soils and areas of sandstone and shale outcroppings. The areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of sandstone and shale outcroppings limit the range production of the unit.

Typically, this Sunburst soil has a surface layer of grayish brown clay loam 3 inches thick. The upper 16 inches of the underlying material is grayish brown silty clay loam, and the lower part to a depth of 60 inches or more is grayish brown and dark grayish brown silty clay.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 16 inches. Runoff is rapid, and the hazard of water erosion is very high. The hazard of soil blowing is high. The soil is calcareous throughout.

This soil is used as rangeland.

Cropland.—This soil is very poorly suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community is mainly little bluestem, bluebunch wheatgrass, green needlegrass, and sideoats grama. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of perennial short grasses, threadleaf sedge, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of this soil. The soil has potential to produce good yields of forage, but the steepness of slope limits the movement of livestock and the accessibility of forage. Use of mechanical treatment practices or rangeland seeding is very difficult because of the steepness of slope.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by steepness of slope.

Homesite development.—This soil is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIe, nonirrigated. It is in Thin Clayey range site, 10- to 14-inch precipitation zone.

131—Tally fine sandy loam, 0 to 4 percent slopes. This deep, well drained soil is on fans, terraces, and foot slopes in the eastern part of the county. It formed in alluvial and eolian material. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Shambo, Lisk, Farnuf, and Macar soils. These areas do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Tally soil has a surface layer of dark grayish brown fine sandy loam 4 inches thick. The upper 11 inches of the subsoil is dark grayish brown and grayish brown sandy loam, and the lower 5 inches is light brownish gray sandy loam. The upper 11 inches of the substratum is light gray fine sandy loam, and the lower part to a depth of 60 inches or more is light brownish gray loamy fine sand.

Permeability is moderately rapid to a depth of about 31 inches and rapid below this depth. Available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This soil is used for nonirrigated farming and as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the high hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry

vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

132—Tally fine sandy loam, 4 to 8 percent slopes. This deep, well drained soil is on fans and foot slopes of low hills in the eastern part of the county. It formed in alluvium and eolian material. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Shambo, Blanchard, Lisk, Farnuf, and Macar soils. The deep, excessively drained Blanchard soils are in swales, on foot slopes, and in areas protected from the prevailing wind. They are droughty and are low in productivity. The Shambo, Lisk, Farnuf, and Macar soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Tally soil has a surface layer of dark grayish brown fine sandy loam 4 inches thick. The upper 11 inches of the subsoil is dark grayish brown and grayish brown sandy loam, and the lower 5 inches is light brownish gray sandy loam. The upper 11 inches of the substratum is light gray fine sandy loam, and the lower part to a depth of 60 inches or more is light brownish gray loamy fine sand.

Permeability is moderately rapid to a depth of about 31 inches and rapid below this depth. Available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IVe, nonirrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

133—Telstad loam, 2 to 8 percent slopes. This deep, well drained soil is in swales and on fans and foot slopes in the northwestern part of the county. It formed in glacial till. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Hillon, Evanston, Yamac, and Thoeny soils. The Hillon soils are in convex areas. They are highly susceptible to soil blowing. The salt- and sodium-affected Thoeny soils are on fans and foot slopes. The salts and sodium reduce the availability of moisture and plant nutrients and restrict

the penetration of roots and moisture into the subsoil and thus limit crop yields. The Evanston and Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Telstad soil has a surface layer of dark grayish brown loam 4 inches thick. The upper 9 inches of the subsoil is dark grayish brown and grayish brown clay loam, and the lower 9 inches is light gray loam. The substratum to a depth of 60 inches or more is light brownish gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. The soil is calcareous below a depth of about 13 inches.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the moderate hazards of water erosion and soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss or blue grama is the dominant vegetation, practices such as shallow chiseling and scalping can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

134—Telstad-Hillon loams, 2 to 8 percent slopes. This map unit is on uplands in the northwestern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Telstad loam and 35 percent Hillon loam. The Telstad soil is in swales and on foot slopes, and the Hillon soil is on the sides and tops of knolls and low hills.

Included in this unit are small areas of Thoeny and Evanston soils. Included areas make up about 15 percent of the total acreage. The salt- and sodium-affected Thoeny soils are in swales and on foot slopes. The salts and sodium reduce the availability of moisture and plant nutrients and restrict the penetration of roots and moisture into the subsoil and thus limit crop yields. The Evanston soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Telstad soil is deep and well drained. It formed in glacial till. Typically, the surface layer is dark grayish brown loam 4 inches thick. The upper 9 inches of the subsoil is dark grayish brown to grayish brown clay loam, and the lower 9 inches is light gray loam. The substratum to a depth of 60 inches or more is light brownish gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 13 inches.

The Hillon soil is deep and well drained. It formed in glacial till. Typically, the surface layer is mostly grayish brown loam 7 inches thick. The underlying material to a depth of 60 inches or more is light gray and pale yellow loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

These soils are used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are well suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. Tall grass barriers trap snow, which increases the amount of moisture in the soil.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—The Telstad soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Hillon soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. If these soils are used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

135—Telstad-Hillon loams, 8 to 15 percent slopes. This map unit is on uplands in the northwestern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Telstad loam and 40 percent Hillon loam. The Telstad soil is on fans and hillsides, and the Hillon soil is on the sides and tops of hills and ridges.

Included in this unit are small areas of Yawdim, Yamac, and Thoeny soils. Included areas make up about 20 percent of the total acreage. The shallow, well drained Yawdim soils are on the upper side slopes and tops of hills and ridges. They are droughty and are low in productivity. The salt- and sodium-affected Thoeny soils are in swales and on fans. The salts and sodium reduce the availability of moisture and plant nutrients and restrict the penetration of roots and moisture into the subsoil and thus limit crop yields. The Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Telstad soil is deep and well drained. It formed in glacial till. Typically, the surface layer is dark grayish brown loam 4 inches thick. The upper 9 inches of the subsoil is mostly grayish brown clay loam, and the lower 9 inches is light gray loam. The substratum to a depth of 60 inches or more is light brownish gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 21 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 13 inches.

The Hillon soil is deep and well drained. It formed in glacial till. Typically, the surface layer is mostly grayish brown loam 7 inches thick. The underlying material to a depth of 60 inches or more is mostly light gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 21 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

These soils are used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on these soils is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Telstad soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Hillon soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. If these soils are used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. Access roads must be designed to provide adequate cut-slope grade, and drains must be used to control surface runoff and keep soil losses to a minimum.

This map unit is in capability subclass IVe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

136—Telstad-Thoeny loams, 2 to 8 percent slopes. This map unit is on fans and foot slopes and in swales on glaciated uplands in the northwestern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Telstad loam and 30 percent Thoeny loam.

Included in this unit are small areas of Hillon, Yamac, and Yawdim soils. Included areas make up about 20 percent of the total acreage. The Hillon and Yamac soils are on fans and side slopes. The Hillon soils are highly susceptible to soil blowing. The shallow, well drained Yawdim soils are on the upper side slopes and tops of hills and ridges. They are droughty and are low in productivity. The Yamac soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Telstad soil is deep and well drained. It formed in glacial till. Typically, the surface layer is dark grayish brown loam 4 inches thick. The upper 9 inches of the subsoil is mostly grayish brown clay loam, and the lower 9 inches is light gray loam. The substratum to a depth of 60 inches or more is light brownish gray loam.

Permeability is slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 13 inches.

The Thoeny soil is deep and well drained and is salt- and sodium-affected. It formed in glacial till. Typically, the surface layer is grayish brown loam 6 inches thick. The upper 6 inches of the subsoil is olive clay loam, and the lower 19 inches is grayish brown and olive gray clay. The substratum to a depth of 60 inches or more is grayish brown clay loam.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or

more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is moderately salt- and sodium-affected at a depth of about 9 inches.

These soils are used mainly as rangeland. They are also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are poorly suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion and by the salt- and sodium-affected subsoil of the Thoeny soil. The salts and sodium in the Thoeny soil reduce the amount of moisture available for plant growth. Keeping tillage at a minimum not only helps to maintain the tilth of the surface layer but also increases water infiltration and reduces the risk of erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community on the Telstad soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Thoeny soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, perennial forbs, and fringed sagewort increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—The Telstad soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Thoeny soil is poorly suited to windbreaks. It is salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by slow and very slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. If these soils are used for septic tank absorption fields, the limitation of slow and very slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVe, nonirrigated. The Telstad soil is in Silty range site, 10- to 14-inch precipitation zone, and the Thoeny soil is in Clay Pan range site, 10- to 14-inch precipitation zone.

137—Thoeny loam, 2 to 8 percent slopes. This deep, well drained, salt- and sodium-affected soil is on fans and foot slopes in the north-central and northeastern parts of the county. It formed in glacial till. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches in the north-central part of the county and about 14 inches in the northeastern part. The average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Telstad, Hillon, and Absher soils in the north-central part of the county and Vida, Absher, and Zahill soils in the northeastern part. The salt- and sodium-affected Absher soils are on hillsides. They are low in productivity. The Telstad, Hillon, Vida, and Zahill soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated crops.

Typically, this Thoeny soil has a surface layer of grayish brown loam 6 inches thick. The upper 6 inches of the subsoil is olive clay loam, and the lower 19 inches is grayish brown and olive gray clay. The substratum to a depth of 60 inches or more is grayish brown clay loam.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is

moderate. The soil is moderately salt- and sodium-affected at a depth of about 6 inches.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is poorly suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion and by the salt- and sodium-affected subsoil. The salts and sodium reduce the amount of moisture available for plant growth. Keeping tillage at a minimum not only maintains the tilth of the surface layer but also increases water infiltration and reduces the risk of erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss or blue grama is the dominant vegetation, practices such as shallow chiseling and scalping can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is poorly suited to windbreaks. It is salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by very slow permeability, low soil strength, and shrink-swell potential. Buildings can be designed to offset the effects of shrinking and swelling. This soil is poorly suited to septic tank absorption fields because of the very slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVs, nonirrigated. It is in Clay Pan range site, 10- to 14-inch precipitation zone.

138—Thoeny-Absher complex, 2 to 8 percent slopes. This map unit is on glaciated uplands in the north-central and northeastern parts of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 12 inches in the north-central part of the county and about 14 inches in the northeastern part. The average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Thoeny loam and 30 percent Absher clay loam. The Absher soil is in sparsely vegetated, shallow depressional areas surrounded by areas of the Thoeny soil.

Included in this unit are small areas of Telstad and Hillon soils in the north-central part of the county and Vida and Zahill soils in the northeastern part. Included areas make up about 20 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Thoeny soil is deep and well drained and is salt- and sodium-affected. It formed in glacial till. Typically, the surface layer is grayish brown loam 6 inches thick. The upper 6 inches of the subsoil is olive clay loam, and the lower 19 inches is grayish brown and olive gray clay. The substratum to a depth of 60 inches or more is grayish brown clay loam.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is moderately salt- and sodium-affected at a depth of about 6 inches.

The Absher soil is deep and well drained and is salt- and sodium-affected. It formed in glacial till. Typically, the surface layer, where mixed to a depth of 7 inches, is grayish brown clay loam. A thin, hard crust is on the surface. The subsoil is mostly light brownish gray clay loam and clay 20 inches thick. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is moderately salt-affected and strongly sodium-affected at a depth of about 5 inches.

These soils are used mainly as rangeland. They are also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are poorly suited to nonirrigated crops because they have a salt- and sodium-affected subsoil. The salts and sodium restrict

penetration by roots and reduce the availability of moisture and nutrients. The percentage of seedlings that emerge is reduced by a hard crust that forms on the surface of the soils as they dry following heavy rainfall. Returning crop residue to the soils or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Minimum tillage, contour cultivation, grassed waterways, and stubble mulch tillage reduce soil blowing, runoff, and water erosion.

Rangeland.—The potential native plant community on the Thoeny soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, blue grama, perennial forbs, and fringed sagewort increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

The potential native plant community on the Absher soil is mainly western wheatgrass, green needlegrass, Montana wheatgrass, winterfat, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, Sandberg bluegrass, perennial forbs, and fringed sagewort increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—These soils are poorly suited to windbreaks. They are salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by very slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. These soils are poorly suited to septic tank absorption fields because of the very slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVs, nonirrigated. The Thoeny soil is in Clay Pan range site, 10- to 14-inch precipitation zone, and the Absher soil is in Dense Clay range site, 10- to 14-inch precipitation zone.

139—Trembles fine sandy loam. This deep, well drained soil is on low terraces and flood plains of the Missouri and Redwater Rivers and their tributaries, in the eastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Ridgelawn, Havrelon, and Banks soils. Also included are small areas of soils on short, steep slopes along terrace edges; these areas can be farmed around. The Ridgelawn, Havrelon, and Banks soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Trembles soil has a surface layer of grayish brown fine sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown and light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to rare periods of flooding during prolonged, high intensity storms. Channeling and deposition are common along streambanks.

This soil is used mainly for nonirrigated and irrigated farming. It is also used as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by moderate available water capacity and the hazard of soil blowing. Because of the droughtiness of the soil, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture and reduce soil blowing.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Because the soil is droughty, light and frequent applications of irrigation water are needed. Leveling is needed in sloping areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Special precautions may be needed to reduce soil blowing until the plant cover has reestablished.

Windbreaks.—This soil is well suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 70. The potential annual production (CMAI) per acre is about 35 cubic feet or 180 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitation for timber management is the difficulty of reestablishing stands of plains cottonwood. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are prairie sandreed, Canada wildrye, slender wheatgrass, common chokecherry, snowberry, Woods rose, field horsetail, green ash, Rocky Mountain juniper, poison-ivy, American licorice, and western meadowrue.

Homesite development.—This soil is poorly suited to homesite development because of the hazard of rare flooding.

This map unit is in capability subclass IIIe, nonirrigated and irrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

140—Trembles fine sandy loam, protected. This deep, well drained soil is on high terraces along the Missouri River, in the northeastern part of the county. It formed in alluvium. Slope is 0 to 2 percent. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 2,100 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Havrelon, Lohler, Banks, and Hoffmanville soils. Also included are small areas of soils on short, steep slopes along terrace edges; these areas can be farmed around. The Havrelon, Lohler, Banks, and Hoffmanville soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated and irrigated farming.

Typically, this Trembles soil has a surface layer of grayish brown fine sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown and light brownish gray fine sandy loam.

Permeability is moderately rapid, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is protected from flooding by Fort Peck Dam.

This soil is used mainly for nonirrigated and irrigated farming. It is also used as rangeland. The main nonirrigated and irrigated crops are wheat, oats, and barley. Irrigated alfalfa hay is also grown.

Cropland.—This soil is well suited to nonirrigated and irrigated crops. It is limited mainly by moderate available water capacity and the hazard of soil blowing. Because of the droughtiness of the soil, successful crop production depends on receiving average or above-average rainfall during the early part of the growing season. Minimum tillage, tall grass barriers, stripcropping, and stubble mulch tillage conserve moisture.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this soil. Because the soil is droughty, light and frequent applications of irrigation water are needed. Leveling is needed in sloping areas for the efficient application and removal of irrigation water.

Rangeland.—The potential native plant community is mainly prairie sandreed, little bluestem, big bluestem, and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and big bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, blue grama, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as Kentucky bluegrass, thistles, and annuals may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-

normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Special precautions may be needed to reduce soil blowing until the plant cover is reestablished.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Woodland.—This soil is suited to plains cottonwood. The site index for plains cottonwood is 65. The potential annual production (CMAI) per acre is about 30 cubic feet or 160 board feet (Scribner rule). Potential production is for an even-aged, fully stocked stand of trees.

The main limitation for timber management is the difficulty of reestablishing stands of plains cottonwood. The understory vegetation competes vigorously with tree seedlings for the limited amount of available water. Shelterwood and selection silvicultural harvesting systems improve regeneration. Immediate site preparation and planting after harvest also may help.

Where this soil is forested, the composition and yield of the plants in the forest understory are different from those of plants on rangeland. Yield is reduced as the overstory tree canopy increases. The potential native forest understory plants beneath a fully stocked stand of plains cottonwood are prairie sandreed, Canada wildrye, slender wheatgrass, common chokecherry, snowberry, Woods rose, field horsetail, green ash, Rocky Mountain juniper, poison-ivy, American licorice, and western meadowrue.

Homesite development.—This soil is well suited to homesite development. It has few limitations. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIe, nonirrigated and irrigated. It is in Sandy range site, 10- to 14-inch precipitation zone.

141—Turner loam, 0 to 4 percent slopes. This deep, well drained soil is on fans and terraces in the southeastern and northeastern parts of the county. It formed in alluvium. Slopes are mainly more than 1,000 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Shambo, Wabek, Farnuf, and Vida soils. The Wabek soils have very gravelly sand within 7 to 15 inches of the surface. They are droughty and are low in productivity. The Shambo, Farnuf, and Vida soils do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Turner soil has a surface layer of brown loam 7 inches thick. The upper 7 inches of the subsoil is dark grayish brown clay loam, and the lower 14 inches is grayish brown and light brownish gray loam. The upper 5 inches of the substratum is light brownish gray gravelly loam, and the lower part to a depth of 60 inches or more is light olive brown very gravelly loamy sand. Very gravelly loamy sand is at a depth of 30 to 40 inches.

Permeability is moderate to a depth of 33 inches and rapid below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks, but the moderate available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and cotoneaster.

Homesite development.—This soil is suited to homesite development. It has few limitations. Because

the substratum is rapidly permeable, effluent from septic tank absorption fields may contaminate ground water.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

142—Twilight-Yetull fine sandy loams, 8 to 15 percent slopes. This map unit is on foot slopes, side slopes, and tops of hills and ridges in the western part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Twilight fine sandy loam and 35 percent Yetull fine sandy loam. The Twilight soil is on the upper side slopes and tops of hills and ridges, and the Yetull soil is on foot slopes and in areas protected from the prevailing winds.

Included in this unit are small areas of Cabbart, Fleak, Rominell, and Yamac soils and sandstone outcroppings. Included areas make up about 20 percent of the total acreage. The areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of sandstone outcroppings limit the range production of the unit.

The Twilight soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 5 inches thick. The upper 5 inches of the subsoil is brown fine sandy loam, and the lower 6 inches is pale brown fine sandy loam. The substratum to a depth of 25 inches is light brownish gray sandy loam. Below this to a depth of 60 inches or more are light brownish gray, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is droughty.

The Yetull soil is deep and somewhat excessively drained. It formed in sandy alluvial and eolian material. Typically, the surface layer is light brownish gray fine sandy loam 6 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loamy sand.

Permeability is rapid, and available water capacity is low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are poorly suited to cultivated crops because of the high hazard of soil blowing and droughtiness of the soils.

Rangeland.—The potential native plant community on the Twilight soil is mainly prairie sandreed, little bluestem, needleandthread, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Yetull soil is mainly sand bluestem, prairie sandreed, Indian ricegrass, little bluestem, and sun sedge. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, sand dropseed, perennial short grasses, threadleaf sedge, perennial forbs, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. These soils are poorly suited to practices such as chiseling and scalping because they are droughty and are more susceptible to soil blowing and water erosion if they are disturbed. Reestablishing plant cover is difficult.

Windbreaks.—These soils are suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are suited to homesite development. They have few limitations. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. In places, excavation for roads can expose material that is highly susceptible to soil blowing. If the Yetull soil is used for septic tank absorption fields, the rapid permeability may cause pollution of the ground water.

This map unit is in capability subclass VIe, nonirrigated. The Twilight soil is in Sandy range site, 10- to 14-inch precipitation zone, and the Yetull soil is in Sands range site, 10- to 14-inch precipitation zone.

143—Typic Fluvaquents, frequently flooded. These deep, poorly drained soils are on flood plains of the Missouri and Redwater Rivers and their major tributaries. The soils are in the northern and southeastern parts of the county. They formed in sandy and gravelly alluvium. Slope is 0 to 2 percent. Elevation is 1,900 to 2,500 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Typic Fluvaquents, saline, and Hanly, Banks, and Ridgelawn soils. These areas do not adversely affect the use and management of this unit for wildlife habitat.

Typic Fluvaquents do not have a typical profile. Generally, Typic Fluvaquents along the Redwater River consist of erratically stratified, nearly barren bars of gravel and sand. Along the Missouri River, Prairie Elk Creek, and Sand Creek, they consist of bars of sand stratified with thin lenses of loam and silt loam. Along the Missouri River these bars have been stabilized by willows and brushy vegetation.

These soils are subject to frequent periods of flooding during high intensity storms. Channeling and deposition are common along streambanks. The soils have a water table from 1 foot above the surface to 1 foot below the surface late in winter and in spring.

These soils are used as wildlife habitat. They are not suited to cultivated crops, rangeland, windbreaks, or homesite development because of the frequent periods of flooding. The vegetation on the unit is highly diverse. Along the Redwater River the unit is a limited source of sand and gravel for building and surfacing roads.

This map unit is in capability subclass VIIw. It has not been assigned to a range site.

144—Typic Fluvaquents, saline. These deep, poorly drained, salt-affected soils are on the bottoms of drainageways and narrow flood plains throughout the county. They formed in alluvium derived from local material. Slope is 0 to 2 percent. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Fleak, Yawdim, Havre, and Glendive soils in the western part of the county and Cabba, Dast, Havrelon, and Trembles soils in the eastern part. These areas do not adversely affect the use and management of this unit as rangeland.

Typic Fluvaquents, saline, do not have a typical profile. They are erratically stratified sandy loam to silty clay.

Permeability is slow to moderate, and available water capacity is moderate or low. The effective rooting depth varies with the depth to the water table. These soils have a water table at the surface to a depth of 2 feet from late in winter through spring and are moist most of the rest of the year. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. These soils are subject to occasional periods of flooding during high intensity storms and during spring runoff. They are strongly salt-affected near the surface.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the high salt content and impracticability of effectively farming the small, odd-shaped areas.

Rangeland.—The potential native plant community is mainly alkali cordgrass, alkali sacaton, Nuttall alkaligrass, Nuttall saltbush, tall sedges, and alkali bluegrass. If the range is excessively grazed, the proportion of these plants decreases and the proportion of western wheatgrass, inland saltgrass, and bottlebrush squirreltail increases. If excessive grazing continues, plants such as foxtail barley, annual saltbush, and other annuals and weedlike forbs may invade. The potential native plant community produces about 3,300 pounds per acre of air-dry vegetation in years of above-normal precipitation and 2,000 pounds in years of below-normal precipitation.

Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. With increased grazing use, these soils may become more salty and thus produce less forage. Only the more salt-tolerant plants will survive. These soils are not suited to seeding or mechanical treatment practices because of the high salt content and the hazard of flooding.

Windbreaks.—These soils are poorly suited to windbreaks because of the high salt content and wetness.

Homesite development.—These soils are poorly suited to homesite development because of the hazard of occasional flooding.

This map unit is in capability subclass VIIw, nonirrigated. It is in Saline Lowland range site, 10- to 14-inch precipitation zone.

145—Typic Ustifluvents, saline. These deep, well drained, strongly salt-affected soils are on flood plains and coulee bottoms in the northern part of the county. They formed in alluvium. Slope is 0 to 2 percent. Elevation is 1,900 to 2,500 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Typic Fluvaquents, saline; Havrelon soils, saline; and Havre and Glendive soils. These areas do not adversely affect the use and management of this unit as rangeland.

Typic Ustifluvents, saline, do not have a typical profile. They are erratically stratified sandy loam to clay loam.

Permeability is slow to moderately rapid, and available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil

blowing is high. This soil is subject to occasional periods of flooding during prolonged, high intensity storms and during spring runoff. Channeling and deposition are common along streambanks. These soils are strongly salt-affected throughout.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the high content of salts and the hazard of occasional flooding.

Rangeland.—The potential native plant community is mainly alkali cordgrass, alkali sacaton, Nuttall alkaligrass, Nuttall saltbush, tall sedges, and alkali bluegrass. If the range is excessively grazed, the proportion of these plants decreases and the proportion of western wheatgrass, inland saltgrass, and bottlebrush squirreltail increases. If excessive grazing continues, plants such as foxtail barley, annual saltbush, other annuals, and weedlike forbs may invade. The potential native plant community produces about 3,300 pounds per acre of air-dry vegetation in years of above-normal precipitation and 2,000 pounds in years of below-normal precipitation.

Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. With increased grazing use, these soils may become more salty and thus produce less forage. Only the more salt-tolerant plant species will grow. These soils are not suited to seeding or mechanical treatment practices because of the high content of salts and the hazard of flooding.

Windbreaks.—These soils are not suited to windbreaks. They are limited mainly by the high content of salts.

Homesite development.—These soils are poorly suited to homesite development because of the hazard of occasional flooding.

This map unit is in capability subclass VIIw, nonirrigated. It is in Saline Lowland range site, 10- to 14-inch precipitation zone.

146—Typic Ustorthents-Typic Ustifluvents association. This map unit is on uplands and flood plains in the eastern part of the county. Slope is 2 to 45 percent. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,500 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Typic Ustorthents and 40 percent Typic Ustifluvents. The strongly sloping to steep Typic Ustorthents are on the sides of coulees and narrow drainageways, and the gently sloping to moderately sloping Typic Ustifluvents are on the bottoms of coulees and narrow drainageways.

Included in this unit are small areas of Typic Fluvaquents, saline, and Trembles, Havrelon, Cabba, and Zahill soils. Also included are small areas of sandstone and shale outcroppings. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

Typic Ustorthents do not have a typical profile; texture ranges from loam to silty clay. They are deep to very shallow, well drained soils that are underlain by weakly consolidated sedimentary beds, semiconsolidated shale, or consolidated shale. Depth to root-limiting material ranges from less than 10 inches to more than 60 inches.

Permeability is slow to moderate, and available water capacity is very low to high. Effective rooting depth varies with depth to root-limiting material. Runoff is medium to very rapid, and the hazard of water erosion is moderate to high. The hazard of soil blowing is moderate to high.

Typic Ustifluvents do not have a typical profile; texture ranges from sandy loam to clay. These soils are deep and are well drained to somewhat poorly drained. They formed in alluvium derived from local sources.

Permeability is slow to moderately rapid, and the available water capacity is high. Effective rooting depth varies with depth to the water table. Some areas of these soils have a seasonal or permanent high water table. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is slight to high. These soils are subject to occasional periods of flooding during high intensity storms and during spring runoff.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because the areas on bottoms are too narrow to effectively cultivate and the areas on side slopes are too steep or too droughty.

Rangeland.—The potential native plant community on the Typic Ustorthents is mainly prairie sandreed, western wheatgrass, green needlegrass, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, and perennial forbs increases. If excessive grazing continues, plants such as broom snakeweed, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

The potential native plant community on the Typic Ustifluvents is mainly little bluestem, green needlegrass, prairie sandreed, slender wheatgrass, and Canada wildrye. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of western wheatgrass, needleandthread, perennial forbs, and silver sagebrush increases. If excessive grazing continues, plants such as annuals, thistles, Kentucky bluegrass, and weedlike forbs may invade. The potential native plant community produces about 3,000 pounds per acre of air-dry vegetation in years of above-normal

precipitation and 2,000 pounds in years of below-normal precipitation.

Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. If the plant cover is disturbed by overgrazing, special protection may be needed on the Ustifluvents to prevent damage from gullying and sheet erosion during periods of runoff. These soils are not suited to seeding or mechanical treatment because of the steepness of slope in some areas of the Typic Ustorthents and the hazard of water erosion on the Typic Ustifluvents.

Windbreaks.—These soils are poorly suited to windbreaks. Trees and shrubs are difficult to select because of the variability of the soils and are difficult to plant and maintain because of the steepness of slope and possibility of a high water table in the bottoms.

Homesite development.—These soils are poorly suited to homesite development. Typic Ustorthents are limited mainly by steepness of slope, and Typic Ustifluvents are limited mainly by the hazard of occasional flooding.

This map unit is in capability subclass VIIe, nonirrigated. The Typic Ustorthents are in Thin Silty range site, 10- to 14-inch precipitation zone, and the Typic Ustifluvents are in Overflow range site, 10- to 14-inch precipitation zone.

147—Ustic Torriorthents-Ustic Torrifluvents association. This map unit is on uplands and flood plains in the western part of the county. Slope is 2 to 45 percent. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Ustic Torriorthents and 40 percent Ustic Torrifluvents. The strongly sloping to steep Ustic Torriorthents are on the sides of coulees and narrow drainageways, and the gently sloping to moderately sloping Ustic Torrifluvents are on the bottoms of coulees and narrow drainageways.

Included in this unit are small areas of Typic Fluvaquents, saline, and Glendive, Havre, Cabbart, and Yawdim soils. Also included are small areas of sandstone and shale outcroppings. Included areas make up about 15 percent of the total acreage. The areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of sandstone and shale outcroppings limit the range production of the unit.

Ustic Torriorthents do not have a typical profile; texture ranges from sandy loam to silty clay. They are deep to very shallow, well drained soils that are underlain by weakly consolidated sedimentary beds, semiconsolidated shale, or consolidated shale. Depth to root-limiting material ranges from less than 10 inches to more than 60 inches.

Permeability is slow to moderate, and available water capacity is very low to high. Effective rooting depth varies with the depth to root-limiting material. Runoff is medium to very rapid, and the hazard of water erosion is moderate to high. The hazard of soil blowing is moderate to high.

Ustic Torrifluvents do not have a typical profile; texture ranges from sandy loam to clay. These soils are deep and well drained to somewhat poorly drained. They formed in alluvium derived from local sources.

Permeability ranges from slow to moderately rapid, and available water capacity is high. Effective rooting depth varies with depth to the water table. In some areas these soils have a seasonal or permanent high water table. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is slight to high. These soils are subject to occasional periods of flooding during high intensity storms and during spring runoff.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because the areas on bottoms are too narrow to effectively cultivate and the areas on side slopes are too steep or too droughty.

Rangeland.—The potential native plant community on the Ustic Torriorthents is mainly little bluestem, prairie sandreed, western wheatgrass, green needlegrass, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, and perennial forbs increases. If excessive grazing continues, plants such as broom snakeweed, annuals, and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

The potential native plant community on the Ustic Torrifluvents is mainly little bluestem, green needlegrass, prairie sandreed, slender wheatgrass, and Canada wildrye. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of western wheatgrass, needleandthread, perennial forbs, and silver sagebrush increases. If excessive grazing continues, plants such as annuals, thistles, Kentucky bluegrass, and weedlike forbs may invade. The potential native plant community produces about 3,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 2,000 pounds in years of below-normal precipitation.

Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. These soils are not suited to seeding or mechanical treatment because of the steepness of slope in some areas of the Ustic Torriorthents and the hazard of water erosion on the Ustic Torrifluvents.

Windbreaks.—These soils are poorly suited to windbreaks. Trees and shrubs are difficult to select

because of the variability of the soils and are difficult to plant and maintain because of the steepness of slope and the possibility of a high water table in the bottoms.

Homesite development.—These soils are poorly suited to homesite development. Ustic Torriorthents are limited mainly by steepness of slope, and Ustic Torrifluvents are limited mainly by the hazard of occasional flooding.

This map unit is in capability subclass VIIe, nonirrigated. The Ustic Torriorthents are in Thin Silty range site, 10- to 14-inch precipitation zone, and the Ustic Torrifluvents are in Overflow range site, 10- to 14-inch precipitation zone.

148—Vanda clay, 0 to 8 percent slopes. This deep, well drained, strongly salt- and sodium-affected soil is on fans and terraces in the northern part of the county. It formed in alluvium. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Marvan, Gerdrum, and Neldore soils. Also included are small areas of noncalcareous soils that are similar to this Vanda soil and are on fans and terraces along the Missouri Breaks. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Vanda soil has a surface layer of light gray clay 2 inches thick. A thin, hard crust is on the surface. The upper 9 inches of the underlying material is light olive gray clay, and the lower part to a depth of 60 inches or more is grayish brown clay.

Permeability is very slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is strongly salt- and sodium-affected at a depth of about 2 inches.

This soil is used as rangeland.

Cropland.—This soil is poorly suited to cultivated crops because the strongly salt- and sodium-affected underlying material reduces the amount of water available to plants and restricts penetration by roots and moisture. These characteristics drastically limit crop yields.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, Montana wheatgrass, winterfat, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, Sandberg bluegrass, low sagebrush, and greasewood increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

This soil is very poorly suited to seeding because of the high content of salts and sodium.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the clayey texture and the high content of salts and sodium.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by very slow permeability, shrink-swell potential, and low soil strength. Buildings can be designed to offset the effects of shrinking and swelling. This soil is poorly suited to septic tank absorption fields because of the very slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIe, nonirrigated. It is in Dense Clay range site, 10- to 14-inch precipitation zone.

149—Vida clay loam, 0 to 2 percent slopes. This deep, well drained soil is on upland benches and in swales in the northeastern part of the county. It formed in glacial till. Slopes are mainly more than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Williams, Shambo, and Zahill soils. The Zahill soils are on the tops of low hills and knolls. They are highly susceptible to soil blowing. The Williams and Shambo soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Vida soil, where mixed to a depth of 7 inches, has a surface layer of brown clay loam. The upper 2 inches of the subsoil is brown clay loam, and the lower 10 inches is light brownish gray loam. The substratum to a depth of 60 inches or more is light gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The soil is calcareous below a depth of about 9 inches.

This soil is used mainly for nonirrigated farming. It is also used as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

In the area north and east of Vida, especially in the vicinity of Montana Highway 201 and in the Wolf Creek drainageway, this soil is susceptible to formation of saline seeps. Suitable practices for reducing the development of saline seeps are using flexible cropping systems, seeding legumes in recharge areas, and providing surface and subsurface drainage where needed.

Rangeland.—The potential native plant community is mainly western wheatgrass, little bluestem, bluebunch wheatgrass, plains muhly, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

150—Vida clay loam, 2 to 8 percent slopes. This deep, well drained soil is on rolling glaciated uplands in the northeastern part of the county. It formed in glacial till. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Zahill, Cambert, Thoeny, and Yawdim soils. The Zahill soils are on the tops of low hills; they are highly susceptible to soil blowing. The Cambert soils are on the upper side slopes of low hills and are moderately deep to root-limiting, sedimentary beds. The salt- and sodium-affected Thoeny soils are in shallow depressional areas on fans and foot slopes. The salts and sodium reduce the moisture and nutrients available to plants and thus limit crop yields. The shallow Yawdim soils are on the side slopes and tops of low hills. They are underlain by root-limiting semiconsolidated shale. The Yawdim soils may have an influence on saline seep development in this area.

Typically, this Vida soil, where mixed to a depth of 7 inches, has a surface layer of brown clay loam. The upper 2 inches of the subsoil is brown clay loam, and the lower 10 inches is light brownish gray loam. The substratum to a depth of 60 inches or more is light gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. The soil is calcareous below a depth of about 9 inches.

This soil is used mainly for nonirrigated farming. It is also used as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion and by the potential for formation of saline seeps. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

In the area north and east of Vida, especially in the vicinity of Montana Highway 201 and in the Wolf Creek drainageway, this soil is susceptible to formation of saline seeps. Suitable practices for reducing the development of saline seeps are using flexible cropping systems, seeding legumes in recharge areas, and providing surface and subsurface drainage where needed.

Rangeland.—The potential native plant community is mainly western wheatgrass, little bluestem, bluebunch wheatgrass, plains muhly, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in

years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

151—Vida-Zahill complex, 2 to 8 percent slopes. This map unit is on undulating to gently rolling glaciated uplands in the northeastern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Vida clay loam and 35 percent Zahill loam. The Vida soil is on side slopes and in swales, and the Zahill soil is on the upper side slopes and tops of low hills.

Included in this unit are small areas of Cabba, Thoeny, and Yawdim soils. Included areas make up about 15 percent of the total acreage. The Cabba and Yawdim soils are droughty and are shallow. The salt- and sodium-affected Thoeny soils are in shallow depressional areas on fans and foot slopes. The salts and sodium reduce the availability of moisture and plant nutrients and thus limit crop yields.

The Vida soil is deep and well drained. It formed in glacial till. Typically, the surface layer, where mixed to a depth of 7 inches, is brown clay loam. The upper 2 inches of the subsoil is brown clay loam, and the lower 10 inches is light brownish gray loam. The substratum to a depth of 60 inches or more is light gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 9 inches.

The Zahill soil is deep and well drained. It formed in glacial till. Typically, the surface layer is brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

These soils are used mainly for nonirrigated farming. They are also used as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are well suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion and by the potential for formation of saline seeps. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

In the area north and east of Vida, especially in the vicinity of Montana Highway 201 and in the Wolf Creek drainageway, these soils are susceptible to formation of saline seeps. Suitable practices for reducing the development of saline seeps are using flexible cropping systems, seeding legumes in recharge areas, and providing surface and subsurface drainage where needed.

Rangeland.—The potential native plant community is mainly western wheatgrass, little bluestem, bluebunch wheatgrass, plains muhly, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—The Vida soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Zahill soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If these soils are used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

152—Vida-Zahill complex, 8 to 15 percent slopes. This map unit is on rolling glaciated uplands in the northeastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Vida clay loam and 40 percent Zahill loam. The Vida soil is on the lower side slopes of hills and ridges, and the Zahill soil is on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Cabba, Macar, Thoeny, and Yawdim soils. Included areas make up about 15 percent of the total acreage. The Cabba and Yawdim soils are on the upper side slopes and tops of hills and ridges. These soils are droughty and are shallow to root-limiting material. The salt- and sodium-affected Thoeny soils are on fans and foot slopes. The salts and sodium reduce the availability of moisture and plant nutrients and thus limit crop yields. The Macar soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Vida soil is deep and well drained. It formed in glacial till. Typically, the surface layer, where mixed to a depth of 7 inches, is brown clay loam. The upper 2 inches of the subsoil is brown clay loam, and the lower 10 inches is light brownish gray loam. The substratum to a depth of 60 inches or more is light gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 9 inches.

The Zahill soil is deep and well drained. It formed in glacial till. Typically, the surface layer is brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

These soils are used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the hazards of water erosion and soil blowing. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community on these soils is mainly western wheatgrass, little bluestem, bluebunch wheatgrass, plains muhly, winterfat, and sideoats grama. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Vida soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

The Zahill soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If these soils are used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. Access roads must be designed to control surface runoff and help stabilize cut slopes.

This map unit is in capability subclass IVe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

153—Wabek sandy loam, 4 to 15 percent slopes. This deep, excessively drained soil is on fans, terraces, and terrace edges throughout the county. It formed in sandy and gravelly outwash deposits. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Telstad, Evanston, Lehr, Cambert, and Vida soils. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Wabek soil has a surface layer of grayish brown sandy loam 7 inches thick. The underlying material to a depth of 60 inches or more is light gray very gravelly sand. Very gravelly sand is at a depth of 7 to 15 inches.

Permeability is very rapid, and available water capacity is very low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 34 inches. Runoff is slow, and the hazard of water erosion is medium. The hazard of soil blowing is high. This soil is calcareous below a depth of about 7 inches. It is very droughty.

This soil is used as rangeland. It is very poorly suited to cultivated crops because it is very droughty.

Rangeland.—The potential native plant community is mainly bluebunch wheatgrass, plains muhly, little bluestem, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, plains muhly, and little bluestem decreases and the proportion of needleandthread, threadleaf sedge, blue grama, green sagewort, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 700 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

This soil is very poorly suited to mechanical treatment or seeding because it is very droughty.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the very low available water capacity.

Homesite development.—This soil is suited to homesite development. It has few limitations. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. If this soil is used for septic tank absorption fields, the very rapid permeability can cause pollution of ground water. The soil is a suitable source of gravel for building and surfacing roads.

This map unit is in capability subclass VIs, nonirrigated. It is in Gravel range site, 10- to 14-inch precipitation zone.

154—Wabek sandy loam, 15 to 45 percent slopes. This deep, excessively drained soil is on terrace edges in the northern part of the county. It formed in sandy and gravelly outwash deposits. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 3,400 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Telstad, Hillon, Vida, Cabba, and Zahill soils. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Wabek soil has a surface layer of grayish brown sandy loam 7 inches thick. The underlying material to a depth of 60 inches or more is light gray very gravelly sand. Very gravelly sand is at a depth of 7 to 15 inches.

Permeability is very rapid, and available water capacity is very low. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 34 inches. Runoff is slow, and the hazard of water erosion is medium. The hazard of soil blowing is high. This soil is calcareous below a depth of about 7 inches. It is very droughty.

This soil is used as rangeland.

Cropland.—This soil is not suited to cultivated crops because of steepness of slope.

Rangeland.—The potential native plant community is mainly bluebunch wheatgrass, plains muhly, little bluestem, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, plains muhly, and little bluestem decreases and the proportion of needleandthread, threadleaf sedge, blue grama, green sagewort, and yucca increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 700 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

This soil is not suited to mechanical treatment or seeding because of the steepness of slope and droughtiness.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the steepness of slope and the very low available water capacity.

Homesite development.—This soil is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. It is in Gravel range site, 10- to 14-inch precipitation zone.

155—Weingart clay, 2 to 8 percent slopes. This moderately deep, well drained, strongly salt- and sodium-affected soil is on foot slopes and lower side slopes in the west-central and northeastern parts of the county. It formed in material derived from semiconsolidated shale. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Zahill, Absher, Gerdrum, and Yawdim soils and shale outcroppings. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Weingart soil, where mixed to a depth of 7 inches, has a surface layer of grayish brown clay. The upper 2 inches of the subsoil is grayish brown clay, and the lower 12 inches is olive gray silty clay. The substratum to a depth of 30 inches is light olive gray silty clay loam. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 20 to 40 inches.

Permeability is very slow, and available water capacity is low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. This soil is strongly salt- and sodium-affected at a depth of about 1 inch. It is droughty.

This soil is used as rangeland.

Cropland.—This soil is very poorly suited to cultivated crops because it is droughty; has semiconsolidated shale at a depth of 20 to 40 inches, which limits rooting depth; and has a high content of salts and sodium in the subsoil, which reduces root and moisture penetration. These characteristics limit crop yields.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, Montana wheatgrass, winterfat, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of blue grama, Sandberg bluegrass, perennial forbs, other perennial short grasses, and big sagebrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

This soil is very poorly suited to seeding because of the high content of salts and sodium.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the clayey texture and the high content of salts and sodium.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by very slow permeability, moderate depth to semiconsolidated shale, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. This soil is poorly suited to septic tank absorption fields because of the very slow permeability and moderate depth to semiconsolidated shale. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIe, nonirrigated. It is in Dense Clay range site, 10- to 14-inch precipitation zone.

156—Williams loam, 0 to 2 percent slopes. This deep, well drained soil is on upland benches and in swales in the northeastern part of the county. It formed in glacial till. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Bowbells, Vida, Thoeny, and Zahill soils. The salt- and sodium-affected Thoeny soils are in shallow depressional areas. The salts and sodium reduce the availability of moisture and plant nutrients and thus limit crop yields. The Zahill soils are on the tops of knolls and low hills. They are highly susceptible to soil blowing. The Bowbells and Vida soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Williams soil has a surface layer of dark grayish brown loam 8 inches thick. The upper 7 inches of the subsoil is dark grayish brown clay loam, and the lower 8 inches is brown clay loam. The substratum to a depth of 60 inches or more is light gray and light olive gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

Most areas of this soil are used for nonirrigated farming. A few areas are used as rangeland. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazard of soil blowing. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

Rangeland.—The potential native plant community is mainly bluebunch wheatgrass, little bluestem, green needlegrass, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderately slow permeability and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

157—Williams loam, 2 to 4 percent slopes. This deep, well drained soil is on upland benches of undulating glaciated uplands in the northeastern part of the county. It formed in glacial till. Slopes are mainly 250 to 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Bowbells, Vida, Thoeny, and Zahill soils. The Zahill soils are on the tops of low hills and knolls. They are highly susceptible to soil blowing. The salt- and sodium-affected Thoeny soils are in shallow depressional areas. The salts and sodium reduce the availability of moisture and plant nutrients and thus limit crop yields. The Bowbells and Vida soils do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

Typically, this Williams soil has a surface layer of dark grayish brown loam 8 inches thick. The upper 7 inches of the subsoil is dark grayish brown clay loam, and the lower 8 inches is brown clay loam. The substratum to a depth of 60 inches or more is light gray and light olive gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Most areas of this soil are used for nonirrigated farming. A few areas are used as rangeland. The main nonirrigated crops are wheat, oats, and barley. If this soil is irrigated, it is prime farmland.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion and by the potential for formation of saline seeps. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

In the area north and east of Vida, especially in the vicinity of Montana Highway 201 and in the Wolf Creek drainageway, this soil is susceptible to formation of saline seeps. Suitable practices for reducing the development of saline seeps are using flexible cropping systems, seeding legumes in recharge areas, and providing surface and subsurface drainage where needed.

Rangeland.—The potential native plant community is mainly bluebunch wheatgrass, little bluestem, green needlegrass, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderately slow permeability and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

158—Williams-Vida complex, 2 to 4 percent slopes. This map unit is on undulating glaciated uplands in the northeastern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Williams loam and 40 percent Vida clay loam. The Williams soil is in swales and on lower side slopes, and the Vida soil is on the tops of knolls and low hills.

Included in this unit are small areas of Bowbells, Thoeny, and Zahill soils. Included areas make up about 10 percent of the total acreage. The Zahill soils are on the tops of low hills and knolls. They are highly susceptible to soil blowing. The salt- and sodium-affected Thoeny soils are in shallow depressional areas on fans and foot slopes. The salts and sodium reduce the availability of moisture and plant nutrients and thus limit crop yields. The Bowbells soils do not adversely affect the use and management of this unit for nonirrigated farming and as rangeland.

The Williams soil is deep and well drained. It formed in glacial till. Typically, the surface layer is dark grayish brown loam 8 inches thick. The upper 7 inches of the subsoil is dark grayish brown clay loam, and the lower 8 inches is brown clay loam. The substratum to a depth of 60 inches or more is light gray and light olive gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Vida soil is deep and well drained. It formed in glacial till. Typically, the surface layer, where mixed to a depth of 7 inches, is brown clay loam. The upper 2 inches of the subsoil is brown clay loam, and the lower 10 inches is light brownish gray loam. The substratum to a depth of 60 inches or more is light gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of about 9 inches.

Most areas of these soils are used for nonirrigated farming. A few areas are used as rangeland. The main nonirrigated crops are wheat, oats, and barley. If these soils are irrigated, they are prime farmland.

Cropland.—These soils are well suited to nonirrigated crops. They are limited mainly by the moderate hazards of soil blowing and water erosion and by the potential for formation of saline seeps. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion.

In the area north and east of Vida, especially in the vicinity of Montana Highway 201 and in the Wolf Creek drainageway, these soils are susceptible to formation of saline seeps. Suitable practices for reducing the development of saline seeps are using flexible cropping systems, seeding legumes in recharge areas, and providing surface and subsurface drainage where needed.

Rangeland.—The potential native plant community is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, green needlegrass, plains muhly, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community on the Williams soil produces about 2,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation. The potential native plant community on the Vida soil produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—The Williams soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, white willow, golden willow, Siberian elm, Siberian crabapple, black hawthorn, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and western sandcherry.

The Vida soil is well suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, white willow, golden willow, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, skunkbush sumac, and silver buffaloberry.

Homesite development.—These soils are poorly suited to homesite development. They are limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If these soils are used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

159—Yamac loam, 0 to 4 percent slopes. This deep, well drained soil is on terraces, fans, and foot slopes in the western part of the county. It formed in alluvium. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambeth, Kremlin, Chinook, and Twilight soils. The moderately deep, well drained Twilight soils are on the upper side slopes and tops of knolls. They are droughty and are low in productivity. The Cambeth, Kremlin, and Chinook soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Yamac soil has a surface layer of grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate. The soil is calcareous below a depth of 11 inches.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazard of soil blowing. The surface layer of the soil is low in organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil. Crops respond well to the application of phosphorus and nitrogen. Stripcropping,

tall grass barriers, field windbreaks, minimum tillage, and stubble mulch tillage reduce soil blowing.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, little bluestem, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, fringed sagewort, silver sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and Kentucky bluegrass may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. In places, excavation for roads can expose material that is highly susceptible to soil blowing.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

160—Yamac loam, 4 to 8 percent slopes. This deep, well drained soil is on fans and foot slopes of low hills in the western part of the county. It formed in alluvium. Slopes are mainly 250 feet to more than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cambeth, Twilight, Chinook, and Rominell soils. The strongly salt- and sodium-affected Rominell soils are on fans and foot slopes. The high content of salts reduces the amount of water available to plants, and the high content of sodium reduces the penetration of roots and moisture. These characteristics limit crop yields. The moderately deep, well drained Twilight soils are on the upper side slopes and tops of hills and ridges. They are droughty and are low in productivity. The Cambeth and Chinook soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Yamac soil has a surface layer of grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. The soil is calcareous below a depth of 11 inches.

This soil is used mainly as rangeland. It is also used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. The surface layer of this soil is low in organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil. Crops respond well to the application of phosphorus and nitrogen.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and fringed sagewort increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate

permeability and low soil strength. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation. In places, excavation for roads can expose material that is highly susceptible to soil blowing. If the soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

161—Yamac loam, 8 to 15 percent slopes. This deep, well drained soil is on the sides of hills and ridges in the western part of the county. It formed in alluvium. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cabbart, Fleak, Twilight, and Rominell soils. Also included are small areas of sandstone outcroppings. The shallow Cabbart and Fleak soils and the moderately deep Twilight soils are on the upper side slopes and tops of hills and ridges. They are droughty and are low in productivity. The strongly salt- and sodium-affected Rominell soils are on fans and foot slopes. The high content of salts decreases the amount of water available to plants, and the high content of sodium reduces the penetration of roots and moisture. These characteristics limit crop yields.

Typically, this Yamac soil has a surface layer of grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. The soil is calcareous below a depth of 4 inches.

Most areas of this soil are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion. The surface layer of this soil is low in organic matter content. Using green manure crops, barnyard manure, and crop residue increases the organic matter content and fertility of the soil. Crops respond well to the application of phosphorus and nitrogen.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and fringed sagewort increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is suited to homesite development. It is limited mainly by moderate permeability and low soil strength. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability.

This map unit is in capability subclass IVe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

162—Yamac-Twilight complex, 2 to 8 percent slopes. This map unit is on uplands in the western part of the county. Slopes are mainly 250 to 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Yamac loam and 30 percent Twilight fine sandy loam. The Yamac soil is on the lower side slopes of hills and ridges, on fans, and in

swales. The Twilight soil is on the upper side slopes and tops of hills and ridges.

Included in this unit are small areas of Fleak, Cabbart, Busby, and Kremlin soils. Included areas make up about 20 percent of the total acreage. The shallow, well drained Cabbart soils and the shallow, somewhat excessively drained Fleak soils are on the tops of knolls and low hills. These soils are droughty and are low in productivity. The Busby and Kremlin soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Yamac soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 4 inches.

The Twilight soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 5 inches thick. The upper 5 inches of the subsoil is brown fine sandy loam, and the lower 6 inches is pale brown fine sandy loam. The substratum to a depth of 25 inches is light brownish gray sandy loam. Below this to a depth of 60 inches or more are light brownish gray, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. This soil is droughty.

Most areas of these soils are used as rangeland. A few areas are used for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—If these soils are used for nonirrigated crops, they are limited by the hazard of soil blowing and the low available water capacity of the Twilight soil. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion. Crops respond to nitrogen and phosphorus fertilizer.

Rangeland.—The potential native plant community on the Yamac soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and fringed sagewort increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The potential native plant community on the Twilight soil is mainly prairie sandreed, little bluestem, needleandthread, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Yamac soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Twilight soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils are suited to homesite development. The Yamac soil is limited mainly by moderate permeability and low soil strength. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate

drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

The Twilight soil has few limitations for homesite development.

This map unit is in capability subclass IVe, nonirrigated. The Yamac soil is in Silty range site, 10- to 14-inch precipitation zone, and the Twilight soil is in Sandy range site, 10- to 14-inch precipitation zone.

163—Yamac-Twilight-Fleak complex, 8 to 15 percent slopes. This map unit is on uplands in the western part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 35 percent Yamac loam, 30 percent Twilight fine sandy loam, and 20 percent Fleak loamy sand. The Yamac soil is on fans and lower side slopes, the Twilight soil is on the upper side slopes and tops of hills and ridges, and the Fleak soil is on the tops of hills and ridges.

Included in this unit are small areas of Cabbart, Busby, and Rominell soils. Also included are small areas of sandstone outcroppings. Included areas make up about 15 percent of the total acreage. The shallow, well drained Cabbart soils are on the tops of hills and ridges. They are droughty and are low in productivity. The strongly salt- and sodium-affected Rominell soils are on fans and in swales. The high content of salts and sodium reduces the water available to plants and reduces the penetration of roots and moisture. These characteristics limit crop yields. The areas of sandstone outcroppings are on ridgetops and can be farmed around. The Busby soils do not adversely affect the use and management of this unit as rangeland.

The Yamac soil is deep and well drained. It formed in alluvium. Typically, the surface layer is grayish brown loam 4 inches thick. The upper 7 inches of the subsoil is olive loam, and the lower 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is pale olive loam.

Permeability is moderate, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 21 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is calcareous below a depth of 4 inches.

The Twilight soil is moderately deep and well drained. It formed in material derived from weakly consolidated, sandy sedimentary beds. Typically, the surface layer is brown fine sandy loam 5 inches thick. The upper 5 inches of the subsoil is brown fine sandy loam, and the lower 6 inches is pale brown fine sandy loam. The substratum to a depth of 25 inches is light brownish gray sandy loam. Below this to a depth of 60 inches or more are light brownish gray, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 20 to 40 inches.

Permeability is moderately rapid, and available water capacity is low. Effective rooting depth is limited by the sedimentary beds at a depth of 20 to 40 inches. Where this soil is under native vegetation, the average annual wetting depth is 20 to 30 inches. The hazard of soil blowing is high. This soil is droughty.

The Fleak soil is shallow and somewhat excessively drained. It formed in weakly consolidated, sandy sedimentary beds. Typically, the surface layer, where mixed to a depth of 7 inches, is olive brown loamy sand. The underlying material to a depth of 16 inches is olive loamy sand. Below this to a depth of 60 inches or more are mostly light olive brown, weakly consolidated, sandy sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is slow to medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is droughty.

These soils are used mainly as rangeland.

Cropland.—These soils are poorly suited to cultivated crops because of the restricted available water capacity of the Twilight and Fleak soils and the hazard of soil blowing.

Rangeland.—The potential native plant community on the Yamac soil is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and fringed sagewort increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Twilight soil is mainly prairie sandreed, little bluestem, needleandthread, and thickspike wheatgrass. If the range is excessively grazed, the proportion of prairie sandreed and little bluestem decreases and the proportion of needleandthread, thickspike wheatgrass, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Fleak soil is mainly prairie sandreed, little bluestem, plains muhly,

and needleandthread. If the range is excessively grazed, the proportion of prairie sandreed, little bluestem, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, yucca, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice on these soils. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture. The Twilight and Fleak soils are poorly suited to practices such as shallow chiseling and scalping because they are droughty and are susceptible to soil blowing and water erosion if they are disturbed.

Windbreaks.—The Yamac soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Twilight soil is suited to windbreaks, but the low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

The Fleak soil is not suited to windbreaks. It is limited mainly by the very low available water capacity.

Homesite development.—These soils are suited to homesite development. The Yamac soil is limited mainly by moderate permeability and low soil strength. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderate permeability. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

The Twilight and Fleak soils have few limitations for homesite development. In places, excavation for roads can expose material that is highly susceptible to soil blowing. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass IVe, nonirrigated. The Yamac soil is in Silty range site, 10- to 14-inch precipitation zone; the Twilight soil is in Sandy range site, 10- to 14-inch precipitation zone; and the Fleak soil is in Shallow range site, 10- to 14-inch precipitation zone.

164—Yawdim silty clay, 2 to 8 percent slopes. This shallow, well drained soil is on the tops and sides of knolls and low hills in the western part of the county. It formed in material derived from semiconsolidated shale. Slopes are mainly less than 1,000 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Yamac, Gerdrum, Weingart, and Busby soils. Also included are small areas of Yawdim soils that have slopes of more than 8 percent. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Yawdim soil has a surface layer of grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. The soil is droughty.

This soil is used as rangeland.

Cropland.—This soil is very poorly suited to cultivated crops because of the very low available water capacity and the root-limiting semiconsolidated shale at a depth of 10 to 20 inches.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,100 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

This soil is very poorly suited to mechanical treatment practices. The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the very low available water capacity.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by shallow depth to semiconsolidated shale, shrink-swell potential, slow permeability, and low soil strength. In the construction of basements or foundations for dwellings,

the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. The soil is poorly suited to septic tank absorption fields because of the slow permeability and shallow depth to semiconsolidated shale. Shrinking and swelling, low soil strength, and shallow depth to semiconsolidated shale can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIs, nonirrigated. It is in Shallow Clay range site, 10- to 14-inch precipitation zone.

165—Yawdim-Badland-Cabbart association. This map unit is on uplands in the west-central part of the county. Slope is 15 to 45 percent. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 30 percent Yawdim silty clay, 30 percent Badland, and 20 percent Cabbart silt loam. The moderately steep Cabbart soil and the moderately steep to steep Yawdim soil are on the sides and tops of hills and ridges. The areas of Badland are steep to very steep and are in coulees, on ridges, and on escarpments.

Included in this unit are small areas of Gerdrum, Absher, Neldore, and Fleak soils. Also included are small areas of soils that have slopes of less than 15 percent. Included areas make up about 20 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid to very rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is droughty.

Badland consists mainly of barren and nearly barren areas that were formed by the active geologic erosion of weakly consolidated, sandy and silty sedimentary beds and semiconsolidated shale. Runoff is rapid or very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is high.

The Cabbart soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is grayish brown silt loam 4 inches thick. The underlying material to a depth of 13 inches is pale olive silt loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

This unit is used as rangeland.

Cropland.—This unit is not suited to cultivated crops because of the steepness of slope and the areas of Badland.

Rangeland.—The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

The potential native plant community on the Cabbart soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, sideoats grama, and plains muhly. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, and creeping juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Use of mechanical treatment practices is not practical.

Windbreaks.—This unit is not suited to windbreaks because of droughtiness and the steepness of slope.

Homesite development.—This unit is poorly suited to homesite development. It is limited mainly by the steepness of slope and the large areas of Badland.

This map unit is in capability subclass VIIe, nonirrigated. The Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone, and the Cabbart soil is in Shallow range site, 10- to 14-inch precipitation zone.

166—Yawdim-Badland-Gerdrum association. This map unit is on uplands in the western and northern parts of the county. Slope is 8 to 45 percent. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 30 percent Yawdim silty clay, 30 percent Badland, and 20 percent Gerdrum clay loam. The strongly sloping Gerdrum soil is on fans, the moderately steep to steep Yawdim soil is on the side slopes and tops of hills and ridges, and the steep to very steep areas of Badland are on terrace edges, ridges, and escarpments and in coulees.

Included in this unit are small areas of Busby, Fleak, Yamac, Absher, and Vanda soils. Included areas make up about 20 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid to very rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is droughty.

Badland consists mainly of barren and nearly barren areas that were formed by active geologic erosion of weakly consolidated, silty and sandy sedimentary beds and semiconsolidated shale. Runoff is very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is very high.

The Gerdrum soil is deep and well drained and is salt- and sodium-affected. It formed in alluvium. Typically, the surface layer, where mixed to a depth of 7 inches, is light brownish gray clay loam. The upper 4 inches of the subsoil is light brownish gray clay, and the lower 9 inches is light brownish gray clay loam. The substratum to a depth of 60 inches or more is mostly light brownish gray clay loam.

Permeability is slow, and available water capacity is moderate. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 20 inches. Runoff is moderate, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is strongly salt-affected and moderately sodium-affected at a depth of about 7 inches.

This unit is used as rangeland.

Cropland.—This unit is not suited to cultivated crops because of the steepness of slope, shallow depth, and droughtiness of the Yawdim soil; the areas of Badland; and the salt- and sodium-affected subsoil of the Gerdrum soil.

Rangeland.—The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,100 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Gerdrum soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, winterfat, and needleandthread. If the range is excessively grazed, the proportion of western wheatgrass, green needlegrass, thickspike wheatgrass, and winterfat decreases and the proportion of needleandthread, blue grama, Sandberg bluegrass, big sagebrush, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 500 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited. Use of mechanical treatment practices is not practical.

Windbreaks.—The Yawdim soil is not suited to windbreaks. It is limited mainly by the very low available water capacity and steepness of slope.

The Gerdrum soil is poorly suited to windbreaks. It is salt- and sodium-affected, which limits the choice of trees and shrubs to Russian-olive and silver buffaloberry.

Homesite development.—The soils in this unit are very poorly suited to homesite development. The Yawdim soil is limited mainly by steepness of slope, shallow depth to semiconsolidated shale, and slow permeability. The Gerdrum soil is limited mainly by slow permeability, shrink-swell potential, and low soil strength. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If these soils are used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field or by excavating the trench to a suitable depth. The field or trench should be backfilled with gravel. Shrinking

and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations. The areas of Badland are not suited to homesite development.

This map unit is in capability subclass VIIe, nonirrigated. The Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone, and the Gerdrum soil is in Clay Pan range site, 10- to 14-inch precipitation zone.

167—Yawdim-Kirby complex, 8 to 35 percent slopes. This map unit is on uplands in the west-central part of the county. Slopes are mainly less than 250 feet long. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 12 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Yawdim silty clay and 35 percent Kirby very channery loam. The strongly sloping to moderately steep Yawdim soil is on the sides of hills and ridges, and the strongly sloping to steep Kirby soil is on the tops of hills and ridges.

Included in this unit are small areas of Cabbart, Fleak, and Gerdrum soils. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid to very rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is droughty.

The Kirby soil is deep and well drained. It formed in material derived from sandstone and shale. Typically, the surface layer is light brown very channery loam 5 inches thick. The upper 13 inches of the underlying material is light brown very channery loam, and the lower part to a depth of 60 inches or more is light brown shale and sandstone fragments. Sandstone and shale fragments are at a depth of 10 to 20 inches.

Permeability is rapid, and available water capacity is very low. Effective rooting depth is limited by the sandstone and shale fragments at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is about 36 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is moderate. This soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the shallow depth to semiconsolidated shale in the Yawdim soil, steepness of slope, droughtiness, and the shallow depth to shale and sandstone fragments in the Kirby soil.

Rangeland.—The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,100 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The potential native plant community on the Kirby soil is mainly bluebunch wheatgrass, little bluestem, sideoats grama, plains muhly, and thickspike wheatgrass. If the range is excessively grazed, the proportion of these grasses decreases and the proportion of needleandthread, perennial short grasses, perennial forbs, skunkbush sumac, and juniper increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 700 pounds per acre of air-dry vegetation in years of above-normal precipitation and 400 pounds in years of below-normal precipitation.

Use of mechanical treatment practices on these soils is not practical.

Windbreaks.—These soils are not suited to windbreaks because of the very low available water capacity.

Homesite development.—These soils are poorly suited to homesite development. The Yawdim soil is limited mainly by steepness of slope in some areas, slow permeability, low soil strength, shrink-swell potential, and shallow depth to semiconsolidated shale. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. This soil is poorly suited to septic tank absorption fields because of the shallow depth to semiconsolidated shale and slow permeability. Shrinking and swelling, low soil strength, and shallow depth to shale can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The less sloping areas of the Kirby soil are suited to homesite development. These areas are limited mainly by the sandstone and shale fragments at a depth of 10 to 20 inches. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on

the contour. The rapid permeability of the soil may cause effluent from absorption fields to contaminate ground water. This soil is suitable for use as base material for roads and streets. It may need to be crushed to yield fragments of the proper size and then mixed with soil material for increased strength and stability. The steeper areas of this soil are poorly suited to homesite development because of the slope.

This map unit is in capability subclass VIIe, nonirrigated. The Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone, and the Kirby soil is in Very Shallow range site, 10- to 14-inch precipitation zone.

168—Zahill loam, 2 to 8 percent slopes. This deep, well drained soil is on undulating and gently rolling glaciated uplands in the northeastern part of the county. It formed in glacial till. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Vida, Macar, Thoeny, and Cambert soils. The salt- and sodium-affected Thoeny soils are in shallow depressional areas on fans and foot slopes. The salts and sodium reduce the availability of moisture and plant nutrients and thus limit crop yields. The Cambert soils are moderately deep to root-limiting, weakly consolidated, silty sedimentary beds. The Vida and Macar soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Zahill soil has a surface layer of brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 30 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. The soil is calcareous throughout.

This soil is used mainly for nonirrigated farming. It is also used as rangeland. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is well suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Stripcropping, tall grass barriers, field windbreaks, minimum tillage, stubble mulch tillage, and grassed waterways reduce soil blowing and water erosion. Crops respond to application of nitrogen and phosphorus fertilizer.

Rangeland.—The potential native plant community is mainly western wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,800 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,200 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IIIe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

169—Zahill loam, 8 to 15 percent slopes. This deep, well drained soil is on rolling glaciated uplands in the northeastern part of the county. It formed in glacial till. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Vida, Macar, Absher, and Cabba soils. Also included are small areas of Zahill soils that have a very stony surface layer. The shallow Cabba soils are on the tops of hills and ridges. They are underlain by root-limiting, weakly consolidated, sandy and silty sedimentary beds at a depth of 10 to 20

inches. The strongly salt- and sodium-affected Absher soils are on fans and foot slopes. The high content of salts and sodium reduces the moisture and nutrients available to plants and thus limits crop yields. The areas of Zahill soils that have a very stony surface layer are primarily north of Cow Creek, along the Dawson County line. The stones in these soils make tillage impractical. The Vida and Macar soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

Typically, this Zahill soil has a surface layer of brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is calcareous throughout.

This soil is used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—This soil is suited to nonirrigated crops. It is limited mainly by the hazards of soil blowing and water erosion. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion.

Rangeland.—The potential native plant community is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The surface layer is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. This soil is suitable for seeding to native or adapted forage species. Where clubmoss and blue grama are the dominant vegetation, practices such as scalping or shallow chiseling can be used to improve the rangeland. Such practices increase water infiltration, reduce plant competition, and allow the more desirable native plants to increase. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—This soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

Homesite development.—This soil is poorly suited to homesite development. It is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass IVe, nonirrigated. It is in Silty range site, 10- to 14-inch precipitation zone.

170—Zahill loam, 15 to 45 percent slopes. This deep, well drained soil is on the sides and tops of hills and ridges in the northeastern part of the county. It formed in glacial till. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

Included in this unit are small areas of Cabba, Yawdim, Vida, and Absher soils. Also included are small areas of Zahill soils that have a very stony loam surface layer. These areas do not adversely affect the use and management of this unit as rangeland.

Typically, this Zahill soil has a surface layer of brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is calcareous throughout.

This soil is used as rangeland.

Cropland.—This soil is very poorly suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. This soil is very poorly suited to rangeland seeding or mechanical treatment practices because of the steepness of slope.

Windbreaks.—This soil is not suited to windbreaks. It is limited mainly by the steepness of slope.

Homesite development.—This soil is poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIe, nonirrigated. It is in Thin Silty range site, 10- to 14-inch precipitation zone.

171—Zahill-Badland complex, 25 to 45 percent slopes. This map unit is on uplands in the northeastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 35 percent Zahill loam and 35 percent Badland. The steep Zahill soil is on the sides and tops of hills and ridges. The steep to very steep areas of Badland are on narrow ridges, in deep coulees, and on escarpments.

Included in this unit are small areas of Vida, Absher, Cabba, Yawdim, and Adger. Included areas make up about 30 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Zahill soil is deep and well drained. It formed in glacial till. Typically, the surface layer is brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

Badland consists mainly of barren and nearly barren areas that were formed by active geologic erosion of weakly consolidated, sandy and silty sedimentary beds and semiconsolidated shale. Runoff is rapid or very rapid, and the hazard of water erosion is very high. The hazard of soil blowing is high.

This unit is used as rangeland.

Cropland.—This unit is not suited to cultivated crops because of steepness of slope and the areas of Badland.

Rangeland.—The potential native plant community on the Zahill soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 800 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited. Use of mechanical treatment practices is not practical.

Windbreaks.—This unit is not suited to windbreaks because of the steepness of slope and the areas of Badland.

Homesite development.—This unit is very poorly suited to homesite development because of the steepness of slope and the areas of Badland.

This map unit is in capability subclass VIIe, nonirrigated. The Zahill soil is in Thin Silty range site, 10- to 14-inch precipitation zone.

172—Zahill-Cabba loams, 8 to 15 percent slopes. This map unit is on uplands in the northeastern part of the county. Slopes are mainly less than 1,000 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 50 percent Zahill loam and 35 percent Cabba loam. The Zahill soil is on the upper side slopes and tops of hills and ridges, and the Cabba soil is on side slopes and the edges of coulees.

Included in this unit are small areas of Vida, Yawdim, Dast, and Shambo soils. Included areas make up about 15 percent of the total acreage. The shallow Yawdim soils are on hillsides. They are underlain by root-limiting, semiconsolidated shale at a depth of 10 to 20 inches. The moderately deep Dast soils are also on hillsides.

They are underlain by weakly consolidated, sandy sedimentary beds at a depth of 20 to 40 inches. The Shambo and Vida soils do not adversely affect the use and management of this unit as rangeland and for nonirrigated farming.

The Zahill soil is deep and well drained. It formed in glacial till. Typically, the surface layer is brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland and for nonirrigated farming. The main nonirrigated crops are wheat, oats, and barley.

Cropland.—These soils are suited to nonirrigated crops. They are limited mainly by the hazards of soil blowing and water erosion. The Cabba soil is also limited by droughtiness and shallow depth to root-limiting sedimentary beds. Minimum tillage, contour cultivation, stripcropping, tall grass barriers, grassed waterways, and return of crop residue to the soil reduce soil blowing and water erosion. Tall grass barriers also reduce evaporation and trap snow, which increases the amount of moisture in the soil. Return of crop residue also helps to maintain good soil tilth. Chiseling stubble fields in fall on the contour or across the slope reduces runoff and water erosion. Subsoiling the Cabba soil increases its effective rooting depth. Crops respond to application of nitrogen and phosphorus fertilizer.

Rangeland.—The potential native plant community on the Zahill soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and needleandthread. If the range is excessively grazed, the proportion of bluebunch wheatgrass, western wheatgrass, and plains muhly decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

The surface layer of these soils is susceptible to water erosion and soil blowing if it is disturbed or the range is overgrazed. Proper grazing use insures good plant vigor and adequate plant cover. Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice. Areas of deteriorated rangeland can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Zahill soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Cabba soil is poorly suited to windbreaks. The very low available water capacity limits the growth of both trees and shrubs. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, western sandcherry, and skunkbush sumac.

Homesite development.—These soils generally are poorly suited to homesite development. The Zahill soil is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Shrinking and swelling and low soil strength can adversely affect the

quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Cabba soil is limited for use as homesites mainly by low soil strength and slow permeability of the underlying sedimentary beds. This soil is poorly suited to septic tank absorption fields because of the slow permeability of the underlying sedimentary beds. Deep cuts needed to provide nearly level road surfaces can expose soft sedimentary beds that can easily be excavated. Low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome this limitation.

This map unit is in capability subclass IVe, nonirrigated. The Zahill soil is in Silty range site, 10- to 14-inch precipitation zone, and the Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone.

173—Zahill-Cabba loams, 15 to 45 percent slopes. This map unit is on uplands in the northeastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Zahill loam and 40 percent Cabba loam. The Zahill and Cabba soils are on the sides and tops of hills and ridges on glaciated uplands.

Included in this unit are small areas of Dast, Vida, Macar, and Yawdim soils. Also included are small areas of sandstone and shale outcroppings. Included areas make up about 20 percent of the total acreage. The areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of sandstone and shale outcroppings limit the range production of the unit.

The Zahill soil is deep and well drained. It formed in glacial till. Typically, the surface layer is brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Cabba soil is shallow and well drained. It formed in material derived from weakly consolidated, sandy and silty sedimentary beds. Typically, the surface layer is light yellowish brown loam 5 inches thick. The underlying material to a depth of 15 inches is light yellowish brown and pale yellow loam. Below this to a depth of 60 inches or more are pale yellow, weakly consolidated, sandy and silty sedimentary beds. Sedimentary beds are at a depth of 10 to 20 inches.

Permeability is moderate, and available water capacity is very low. Effective rooting depth is limited by the sedimentary beds at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout. It is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Zahill soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

The potential native plant community on the Cabba soil is mainly bluebunch wheatgrass, little bluestem, western wheatgrass, plains muhly, and sideoats grama. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, threadleaf sedge, and perennial forbs increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,200 pounds per acre of air-dry vegetation in years of above-normal precipitation and 700 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. The soils are not suited to rangeland seeding and mechanical treatment practices because of the steepness of slope. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

Windbreaks.—These soils are not suited to windbreaks because of the steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Zahill soil is in Thin Silty range site, 10- to 14-inch precipitation zone, and the Cabba soil is in Shallow range site, 10- to 14-inch precipitation zone.

174—Zahill-Yawdim complex, 4 to 15 percent slopes. This map unit is on uplands in the northeastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 45 percent Zahill loam and 40 percent Yawdim silty clay. The Zahill soil is on the upper side slopes and tops of hills, and the Yawdim soil is on side slopes and the edges of coulees.

Included in this unit are small areas of Weingart, Gerdrum, Adger, and Thoeny soils. Included areas make up about 15 percent of the total acreage. These areas do not adversely affect the use and management of this unit as rangeland.

The Zahill soil is deep and well drained. It formed in glacial till. Typically, the surface layer is brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 27 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is calcareous throughout.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is droughty.

These soils are used as rangeland.

Cropland.—The Yawdim soil is poorly suited to cultivated crops mainly because it is droughty and is low in productivity.

Rangeland.—The potential native plant community on the Zahill soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,600 pounds per acre of air-dry vegetation in years of above-normal precipitation and 1,000 pounds in years of below-normal precipitation.

The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

Rangeland seeding of native plants or adapted grasses and legumes is a suitable practice on these soils. Areas of deteriorated rangeland on the Zahill soil can be improved by mechanical treatment practices such as shallow chiseling and scalping. Conducting fieldwork on the contour or across the slope, where practical, reduces erosion and conserves moisture.

Windbreaks.—The Zahill soil is suited to windbreaks. Suitable trees for planting are Russian-olive, Siberian elm, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, and skunkbush sumac.

The Yawdim soil is not suited to windbreaks. It is limited mainly by the very low available water capacity.

Homesite development.—These soils are poorly suited to homesite development. The Zahill soil is limited mainly by moderately slow permeability, low soil strength, and shrink-swell potential. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. If this soil is used for septic tank absorption fields, use of gravel backfill in the absorption line trench, excavated to a suitable depth, helps to compensate for the limitation of moderately slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

The Yawdim soil is limited for use as homesites mainly by shallow depth to semiconsolidated shale, shrink-swell potential, low soil strength, and slow permeability. In the construction of basements or foundations for dwellings, the limitation of shrink-swell potential can be overcome by backfilling with suitable material that has low shrink-swell potential. This soil is poorly suited to septic tank absorption fields because of slow permeability and shallow depth to semiconsolidated shale. Shrinking and swelling, low soil strength, and shallow depth to

semiconsolidated shale can adversely affect the quality of roadbeds and road surfaces. Adequate drainage and the use of suitable fill material that is properly compacted can overcome these limitations.

This map unit is in capability subclass VIe, nonirrigated. The Zahill soil is in Silty range site, 10- to 14-inch precipitation zone, and the Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone.

175—Zahill-Yawdim complex, 15 to 45 percent slopes. This map unit is on the sides and tops of hills and ridges of glaciated uplands in the northeastern part of the county. Slopes are mainly less than 250 feet long. Elevation is 2,000 to 2,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 43 degrees F, and the average frost-free season is about 115 days.

This unit is about 40 percent Zahill loam and 40 percent Yawdim silty clay.

Included in this unit are small areas of Gerdrum, Absher, Vida, Weingart, and Thoeny soils. Also included are small areas of shale outcroppings. Included areas make up about 20 percent of the total acreage. The areas of soil do not adversely affect the use and management of this unit as rangeland. The areas of shale outcroppings limit the range production of the unit.

The Zahill soil is deep and well drained. It formed in glacial till. Typically, the surface layer is brown loam 6 inches thick. The upper 16 inches of the underlying material is pale brown clay loam, and the lower part to a depth of 60 inches or more is light brownish gray clay loam.

Permeability is moderately slow, and available water capacity is high. Effective rooting depth is 60 inches or more. Where this soil is under native vegetation, the average annual wetting depth is about 24 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is calcareous throughout.

The Yawdim soil is shallow and well drained. It formed in material derived from semiconsolidated shale. Typically, the surface layer is grayish brown silty clay 6 inches thick. The underlying material to a depth of 15 inches is light olive gray silty clay. Below this to a depth of 60 inches or more is light olive gray semiconsolidated shale. Semiconsolidated shale is at a depth of 10 to 20 inches.

Permeability is slow, and available water capacity is very low. Effective rooting depth is limited by the semiconsolidated shale at a depth of 10 to 20 inches. Where this soil is under native vegetation, the average annual wetting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. This soil is droughty.

These soils are used as rangeland.

Cropland.—These soils are not suited to cultivated crops because of the steepness of slope.

Rangeland.—The potential native plant community on the Zahill soil is mainly little bluestem, bluebunch wheatgrass, sideoats grama, plains muhly, western wheatgrass, and winterfat. If the range is excessively grazed, the proportion of these plants decreases and the proportion of needleandthread, perennial short grasses, fringed sagewort, and perennial forbs increases. If excessive grazing continues, plants such as annuals, weedlike forbs, and clubmoss may invade. The potential native plant community produces about 1,400 pounds per acre of air-dry vegetation in years of above-normal precipitation and 850 pounds in years of below-normal precipitation.

The potential native plant community on the Yawdim soil is mainly western wheatgrass, green needlegrass, thickspike wheatgrass, and Nuttall saltbush. If the range is excessively grazed, the proportion of these plants decreases and the proportion of Sandberg bluegrass, blue grama, big sagebrush, perennial forbs, and rabbitbrush increases. If excessive grazing continues, plants such as annuals and weedlike forbs may invade. The potential native plant community produces about 1,000 pounds per acre of air-dry vegetation in years of above-normal precipitation and 600 pounds in years of below-normal precipitation.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas of these soils. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited. The soils are not suited to rangeland seeding or mechanical treatment practices because of the steepness of slope.

Windbreaks.—These soils are not suited to windbreaks. They are limited mainly by the steepness of slope.

Homesite development.—These soils are poorly suited to homesite development because of the steepness of slope and the shallow depth to semiconsolidated shale in the Yawdim soil.

This map unit is in capability subclass VIIe, nonirrigated. The Zahill soil is in Thin Silty range site, 10- to 14-inch precipitation zone, and the Yawdim soil is in Shallow Clay range site, 10- to 14-inch precipitation zone.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in providing the nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U. S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, length of growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is managed properly. Prime farmland produces the highest yields with minimal energy and economic resources, and farming it results in the least disturbance of the environment.

Prime farmland may now be in cultivated cropland, rangeland, woodland, or other uses. It does not include urban and built-up areas or water areas. To qualify as prime farmland, it must either be used for producing food or fiber or be available for these uses. For more detailed information on the criteria for prime farmland, consult the local office of the Soil Conservation Service.

The prime farmland in this survey area has an adequate and dependable supply of water for irrigation. It also has a favorable temperature and length of growing season and an acceptable level of acidity or alkalinity. Some soils may be effervescent in the surface layer, but the finely divided calcium carbonate is less than 5 percent. Prime farmland has few if any rocks and is permeable to water and air. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not frequently flooded. The slope ranges from 0 to 4 percent.

The following map units, or soils, in McCone County qualify as prime farmland if they are irrigated. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

13	Bowbells loam
14	Bryant silt loam, 0 to 4 percent slopes
63	Farland silt loam, 0 to 4 percent slopes
64	Farnuf loam, 0 to 4 percent slopes
74	Glendive loam
75	Glendive loam, protected
76	Glendive silty clay loam
77	Glendive silty clay loam, protected
80	Harlem silty clay
81	Harlem silty clay, protected
82	Havre silt loam
83	Havre silt loam, protected
84	Havre silty clay loam
85	Havre silty clay loam, protected
86	Havrelon loam
87	Havrelon loam, protected
89	Havrelon silty clay loam
90	Havrelon silty clay loam, protected
96	Hoffmanville silty clay, protected
102	Lohler silty clay loam, protected
103	Lohler silty clay
104	Lohler silty clay, protected
107	Macar loam, 0 to 4 percent slopes
123	Savage silty clay loam, 0 to 4 percent slopes
141	Turner loam, 0 to 4 percent slopes
156	Williams loam, 0 to 2 percent slopes
157	Williams loam, 2 to 4 percent slopes
158	Williams-Vida complex, 2 to 4 percent slopes

About 12,250 acres already is irrigated and meets all the requirements for prime farmland. Approximately 9,100 acres of this total is made up of Harlem silty clay, protected; Havre silty clay loam, protected; Havrelon silty clay loam, protected, and Lohler silty clay loam, protected. These soils are on terraces of the Missouri River and are associated with general soil map unit 2. They are mainly used for alfalfa hay, spring wheat, and barley. The remaining 3,150 acres is made up of small areas on the Missouri River terraces and small scattered areas along Redwater River, Prairie Elk Creek, and their tributaries. These areas are in general soil map units 1, 2, and 3. They are used mainly for alfalfa hay.

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Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; and as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 30 percent of the county is used for cultivated crops. About 500,000 acres is in nonirrigated crops and about 12,250 acres, mainly along the Missouri and Redwater Rivers and Prairie Elk Creek, is in irrigated crops. Spring wheat and winter wheat are the principal nonirrigated crops, but barley, safflower, oats, alfalfa hay, grass-legume hay, and grass hay are also grown.

Alfalfa hay is the principal irrigated crop. Grass-legume hay, spring wheat, and corn for silage are other important irrigated crops grown.

The main concerns in managing nonirrigated cropland in this county are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility. In the northeastern part of the county saline seeps are a serious problem, contaminating about 1,000 acres.

Conserving moisture generally entails reducing evaporation, limiting runoff, increasing infiltration, and controlling weeds. Among the effective means of conserving moisture are stubble mulching, contour farming, stripcropping, using field windbreaks, timely tillage, minimum tillage, and using crop residue. Fallow helps to conserve moisture as well as to control weeds and to release nitrogen from the organic matter by bacterial action.

Among the measures that help to control soil blowing and water erosion are stubble mulch tillage, stripcropping, using field windbreaks and tall grass barriers, contour cultivating, minimum tillage, returning crop residue to the soil, and using diversions and grassed waterways. Generally, a combination of several of these measures is used.

Among the measures that help to maintain fertility are applying chemical fertilizer and barnyard manure and using green manure crops. Controlling erosion also helps to maintain fertility. All of the soils in the county used for nonirrigated crops respond to fertilizer.

Suitable practices for reducing the development of saline seeps are using flexible cropping systems, seeding legumes in recharge areas, and providing surface and subsurface drainage where needed. Weed control, fertilization, stubble management, use of wind

barriers and shelterbelts, proper tillage, and erosion control also need to be considered.

The main concerns in managing irrigated cropland in this county are land leveling, ditch lining, erosion control structures, irrigation water quality, and the timely application of the proper amounts of water.

In recent years there has been interest in growing safflower and millet in the county; however, a limited amount of acreage is planted to these crops. In 1980, 527 acres of millet was grown and 5,000 acres of safflower was grown.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Rangeland

by Robert Lineard, range conservationist, Soil Conservation Service.

Rangeland produces a native plant community of mainly grasses, forbs, and shrubs. The primary use of rangeland is grazing domestic livestock. However, it has other uses such as for wildlife, recreation, watershed, and natural beauty.

In this county about 63 percent of the land, or slightly more than 1 million acres, is managed as rangeland. It is the largest single resource in the county, providing forage for nearly 50,000 head of cattle and nearly 15,000 head of sheep in 1977. The sale of livestock and livestock products accounts for about one-half of the farm and ranch income. Cow-calf operations are dominant. Some operators hold calves for sale as yearlings.

There are many different soils in this county. For this reason, there are several different kinds of rangeland called range sites. Over the centuries, nature has developed a combination of plants that are best adapted to particular soils and climate. If not abnormally disturbed, this combination of plants is the potential or climax plant community for the site. Climax plant communities are not static and will vary slightly from year to year and place to place. Each range site will differ from other range sites in the kind, amount, and proportion of native plants that it supports.

Range conservationists and soil scientists group the soils into appropriate range sites. Thus, range sites generally can be determined from the soil map.

Soil properties that affect moisture supply and plant nutrients have the most influence on range production. Soil reaction, salt content, and a seasonal high water table are also important in determining the kinds of plants that grow in a particular location.

Abnormal disturbance, such as repeated overuse by livestock or excessive burning, erosion, or plowing, will change the climax plant community. If the disturbance is severe enough, the climax community can be completely destroyed and less desirable plants such as annuals and weedlike plants may invade.

Four range condition classes are used to show the extent of deterioration. Rangeland is in excellent condition if more than 75 percent, by weight, of the present plant community is the same as the climax plant community. It is in good condition if the percentage is 51 to 75; fair if the percentage is 26 to 50; and poor if the percentage is less then 25.

Knowledge of the range site and condition is necessary as a basis for planning and applying needed management to improve or maintain the desired plant community for selected uses. Such information is needed for choosing management objectives, planning grazing systems and stocking rates, determining wildlife management, determining recreation potential, and rating watershed conditions.

Rangeland management needs to provide for a plant cover that will adequately protect or improve the soil and water resources and that will meet the needs of the operator. This generally involves restoring the plant community to near climax condition. Sometimes, however, a plant cover somewhat below potential will better fit specific grazing or wildlife habitat needs while still protecting the resource.

Grazing management is the most important part of any rangeland management program. Proper grazing, deferred grazing, and planned rotation grazing systems are key practices. Rancher experience and research have shown that if about one-half of the current year's growth of range plants is grazed, a plant community in good or excellent condition can be maintained and one in fair condition can be improved. The remaining one-half enables the plant to make food for regrowth, root development, and storage for future growth. This makes the desirable plants healthier and helps keep them from being replaced by less desirable plants and weeds. It also protects the soil from erosion by wind or water and acts as a mulch that improves soil tilth and water infiltration and reduces runoff.

Certain practices are often needed to obtain uniform grazing use. These include development of water for livestock, fencing, proper location of salt and mineral supplements, constructing stock trails in rougher areas, and riding or herding. These practices generally are essential for good rangeland management.

Special improvement practices are needed in places where management practices do not achieve the desired results or where recovery is too slow by forage management alone. These include range seeding, brush control, waterspreading, prescribed burning, and mechanical treatment.

Where feasible, mechanical renovation practices such as shallow chiseling and scalping can help to speed recovery. These practices open up the soil surface to allow more moisture to be absorbed, which encourages production of the more desirable plants. Use of these practices and brush control must be followed by resting or deferred grazing for at least two growing seasons to allow better recovery of the desired plants.

Seeding may be needed in areas dominated by less desirable plants. A clean, firm seedbed should be prepared, seeded to adapted native species, and then rested two growing seasons to allow the new plants to become established.

Good rangeland management results in rangeland that can adequately support the livestock and wildlife in the county. It also adds to the natural beauty of the area.

Woodland Management and Productivity

About 4,500 acres of the county is forested, of which 3,600 acres is productive enough to be considered commercial. The commercial forests mostly grow on

alluvial soils along the Missouri River. Small areas of noncommercial forests of ponderosa pine and Rocky Mountain juniper are near Fort Peck Reservoir, mostly on shallow soils derived from shale. The most common tree species growing in the commercial forests along the Missouri River is plains cottonwood. Box elder, green ash, and Russian-olive commonly grow in the understory of cottonwood stands.

Stands of cottonwood commonly grow on the Glendive, Hoffmanville, Hanly, Harlem, Havre, Havrelon, Lohler, and Trembles soils. Some of the forest land on these soils has been converted to cropland and pastureland.

All of the forest land within the county is grazed. In winter, forests along the Missouri River provide protection for livestock and ranchers use the forested areas for feeding areas.

A small number of the cottonwood trees are harvested for firewood. Little additional use is made of the wood, although it does have value as chips for paper, decking, crating, and framing for stuffed furniture.

Reestablishment of cottonwood from seed is most successful in seedbeds of moist mineral soils, commonly in areas subject to flooding. Cottonwood can also regenerate by root or stump sprouts; however, the ability of the trees to sprout decreases as they get older. With the construction of Fort Peck Dam, flooding has been reduced; consequently, areas suitable for the regeneration of cottonwood from seed have been reduced. The control of the water level in the Missouri River below Fort Peck Reservoir may also have reduced the productivity of the stands of cottonwood. Rate of diameter growth has been reduced since the construction of the reservoir. In future years, the planting of cottonwood seedlings may become necessary to maintain cottonwood stands. Green ash regenerates successfully from seed in areas where water temporarily ponds. Russian-olive can be established from seed under stands of cottonwood. Cottonwood is the most desirable of these trees for commercial wood production.

To aid those who manage forest land in this county, soil interpretations relating to forest use and management have been developed. Factors considered for interpretation are timber productivity, erosion hazard, equipment limitations, plant competition, seedling mortality, windthrow hazard, applicable silvicultural systems, and kinds of understory plants.

Woodland management information for each forested soil is given in the map unit descriptions in the section "Detailed Soil Map Units." If a particular management limitation is not discussed in the map unit, the limitation is not significant to use and management of the unit for timber production. The map units that include forest land are listed below.

75 Glendive loam, protected.
77 Glendive silty clay loam, protected.
78 Glendive-Hanly complex, protected.
79 Hanly loamy fine sand.
81 Harlem silty clay, protected.
84 Havre silty clay loam.
85 Havre silty clay loam, protected.
86 Havrelon loam.
87 Havrelon loam, protected.
89 Havrelon silty clay loam.
90 Havrelon silty clay loam, protected.
96 Hoffmanville silty clay, protected.
102 Lohler silty clay loam, protected.
104 Lohler silty clay, protected.
139 Trembles fine sandy loam.
140 Trembles fine sandy loam, protected.

In the following paragraphs definitions and explanations of the terms used in the discussion of woodland management in the map units are given.

Potential soil productivity is the estimated yield of each forest species that a given soil can produce under a given level of management. It is expressed as a site index. This index is the average height, in feet, that the dominant and codominant trees of a given species attain in a specified number of years. For cottonwood the specified number is 30 years. Site index values can be related to yield tables to determine the potential yield of wood products per acre in board feet or cubic feet. The species for which yield and site index calculations were made in each map unit generally are the most common ones on the unit and the most desirable to manage for timber production.

The site index values for plains cottonwood were determined by adjusting site index curves for eastern cottonwood (*3*). Gross board foot volumes per acre were determined by measurements taken during the soil survey. Eight-foot logs down to an 8-inch diameter at the top were measured in determining board foot volumes. Cubic volume per acre was determined by applying a conversion factor of 5.2 board feet per cubic foot. Cubic volume includes the entire tree, excluding the bark and twigs.

Ratings of the erosion hazard indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of equipment limitation reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of windthrow hazard are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of plant competition indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

Species suitability refers to tree species that are adapted to the soil being rated and are desirable to plant or manage for timber production.

Silvicultural system refers to methods of harvesting trees that provide for the regeneration of desirable tree species, develop a desirable stand structure, and aid in insect and disease control. The application of a particular silvicultural system is determined by the kinds of trees a given soil supports, management objectives, and the condition of the stand.

The selection silvicultural system involves the removal of mature and immature trees either singly or in groups at specific intervals (*8*). Regeneration is established almost continuously, and an uneven-aged stand is maintained. This system favors the regeneration of the more tolerant of associated trees.

The shelterwood silvicultural system involves removing the stand in a series of cuts. Regeneration occurs under a partial forest canopy. After regeneration is established, a final cut removes the shelterwood and permits the stand to develop in the open as an even-aged stand. This system is well adapted to sites where shelter is needed for new reproduction, and it favors regeneration of the less tolerant species in a forest stand.

Culmination of mean annual increment (CMAI) is the point in time at which average annual yield reaches the maximum.

Windbreaks

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Windbreaks are discussed in the map unit descriptions in the section "Detailed Soil Map Units." Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or of the Cooperative Extension Service or from a nursery.

Recreation

The potential for recreational development in this county is greatest in the vicinity of Vida and Circle and along the shores of Fort Peck Lake. Along Fort Peck Lake the U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service have developed camping, picnicking, and boat launching facilities. Use of the facilities is increasing yearly.

The soils of the survey area are rated in table 6 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 6, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 6 can be supplemented by other information in this survey, for example,

interpretations for septic tank absorption fields in table 8 and interpretations for dwellings without basements and for local roads and streets in table 7.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

By Ronald F. Batchelor, biologist, Soil Conservation Service.

The abundance of wildlife is directly related to the extent and diversity of its habitat. Productive, well managed soils generally support or have potential to support vigorous wildlife populations, while infertile, poorly managed soils generally support sparse populations. The suitability of a given habitat for a wildlife species depends greatly on the nature of the plant community, and the quantity, quality, and distribution of a particular habitat is determined by prevailing land use practices and management. These factors are governed to some extent by the soils in the areas. Climate, present use of the soils, juxtaposition of habitat types or elements, and present distribution of wildlife species also affect wildlife habitat. For these reasons, the selection and suitability of an area for wildlife habitat requires onsite evaluation.

Grassland, nonirrigated and irrigated cropland, riparian woodland, streams and rivers, ponds, marshes, and reservoirs provide a variety of habitat for wildlife in this county.

Irrigated and nonirrigated farming made possible the successful introduction of the ring-necked pheasant and the gray partridge, particularly on the bottom lands of the Missouri River and its tributaries. Small grain, irrigated crops, annual weeds, and brushy cover are all available. Pheasant populations in the county are limited by the very farming practices that fostered them. In recent years, more intensive farming and the loss of brushy fence rows, densely vegetated ditchbanks, and idle areas have coincided with a decline in the numbers of pheasants. There has also been increased grazing of the flood plains adjacent to and within areas used as winter cover for pheasants.

Land management practices beneficial to pheasants include proper grazing, maintaining woody cover, and retaining stubble and waste grain on the soil during winter by avoiding fall tillage, growing shelterbelts and hedgerows of woody plantings, and growing crops for control of erosion. These practices are also beneficial to a variety of nongame birds. The irrigated and nonirrigated cropland, brushy ditchbanks, and fence rows on general map unit 2 provide habitat for ring-necked pheasant.

The grain fields, shelterbelts, and brushy drainageways on units 4, 13, and 15 provide good upland habitat. Units 13, 14, and 16 support vegetation suitable as habitat for sharp-tailed grouse and gray partridge. The vegetation includes grain, brush in draws, trees, fruit-bearing shrubs, such as chokecherry, plum, rose, snowberry, and buffaloberry, and grasses. Land management practices beneficial to sharp-tailed grouse and gray partridge include proper grazing to maintain sufficient vegetation for nesting, roosting, and rearing of young and protection of woody vegetation in draws and along fence rows. Sage grouse use the brush in the drainageways and the sagebrush rangeland on units 7 and 10. Optimum vegetation for sage grouse habitat consists of big sagebrush, silver sagebrush, forbs, and grasses.

White-tailed deer and mule deer are throughout the county. White-tailed deer generally are along the flood plain of the Missouri River and its tributaries, mainly in units 1 and 2. Mule deer are mainly in the western part of the county, on the uplands, brushy bottoms, and broken rangelands of units 19, 20, and 21. Pronghorn antelope occupy the prairies of the county along with domestic livestock. Units 13, 16, and 20 provide most of the habitat for pronghorn antelope. Proper management of rangeland is important for maintaining adequate habitat for pronghorn antelope.

The Missouri River and marshes, ponds, and reservoirs throughout the county provide habitat for an abundance of waterfowl during spring and fall migrations. Migatory birds use riverine habitat for nesting, feeding, and resting. Substantial populations of Canada geese use the river throughout the year. Geese nest on the

larger islands and use sparsely vegetated sandbars as resting and feeding areas. Croplands adjacent to the river are important feeding areas for migratory waterfowl.

Beaver, mink, muskrat, and raccoon are throughout the principal watercourses. Cottontail rabbit, badgers, ground squirrels, coyotes, and a variety of small mammals can be found throughout the county.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 7 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, slippage, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented

pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, potential for slippage, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 8 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 8 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 8 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, slippage, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted,

and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 8 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, slippage, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 9 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table may be 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They may be wet, and the depth to the water table may be less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 9, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 10 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 10 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a

cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 11 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 12 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate or high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 12, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 13 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 13 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a

saturated zone, namely grayish colors or mottles in the soil. Indicated in table 13 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 13.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*9*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 14, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ochrept (*Ochr*, meaning pale, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Ustochrepts (*Ust*, meaning ustic moisture regime, plus *ochrept*, the suborder of the Inceptisols.

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Ustochrepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, frigid Typic Ustochrepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*7*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*9*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Absher Series

The Absher series consists of deep, well drained, very slowly permeable, salt- and sodium-affected soils that formed in alluvium or glacial till. These soils are in small depressional areas on fans, foot slopes, and hillsides of uplands. Slope is 0 to 15 percent.

These soils are fine, montmorillonitic Borollic Natrargids.

Typical pedon of an Absher clay loam in an area of Gerdrum-Absher clay loams, 0 to 8 percent slopes, in rangeland, about 450 feet north and 1,970 feet east of the southwest corner of sec. 21, T. 21 N., R. 44 E.

A2—0 to 1 inch; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many fine vesicular pores; mildly alkaline; abrupt smooth boundary.

B21t—1 inch to 5 inches; grayish brown (2.5Y 5/2) heavy clay loam, dark grayish brown (2.5Y 4/2) moist; strong fine and medium prismatic structure parting to strong fine and medium subangular blocky; hard, firm, sticky and plastic; few fine roots; common fine tubular pores; common thin clay films on horizontal and vertical faces of peds; moderately alkaline; clear wavy boundary.

B22t—5 to 11 inches; grayish brown (2.5Y 5/2) heavy clay loam, dark grayish brown (2.5Y 4/2) moist; strong fine and medium prismatic structure parting to strong fine and medium subangular blocky; hard, firm, sticky and plastic; few fine roots; common fine tubular pores; common thin clay films on horizontal and vertical faces of peds; slightly effervescent; strongly alkaline; clear wavy boundary.

B31ca—11 to 16 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium and coarse prismatic structure; hard, firm, sticky and plastic; few fine roots; common fine tubular pores; common threadlike masses of lime; strongly effervescent; strongly alkaline; clear wavy boundary.

B32ca—16 to 27 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; strong coarse prismatic structure; hard, firm, sticky and plastic; common fine tubular pores; common threadlike masses of lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

C1ca—27 to 35 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, sticky and plastic; common fine tubular pores; common threadlike masses of lime; strongly effervescent; strongly alkaline; clear wavy boundary.

C2ca—35 to 47 inches; light brownish gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine tubular pores; common threadlike masses of lime; strongly effervescent; strongly alkaline; clear wavy boundary.

C3ca—47 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, sticky and plastic; common fine tubular pores; common threadlike masses of lime; strongly effervescent; strongly alkaline.

The A2 horizon typically is silt loam, but in some pedons it is fine sandy loam or silty clay loam. The B2t horizon is silty clay, silty clay loam, or clay loam and is more than 35 percent clay. It is moderately alkaline to very strongly alkaline. The B3 and C horizons are strongly alkaline or very strongly alkaline. Texture is silty clay loam, clay, or clay loam in the B3 horizon and is mainly sandy clay loam or clay loam in the C horizon.

Adger Series

The Adger series consists of deep, well drained, slowly permeable, salt- and sodium-affected soils that formed in alluvium. These soils are on fans, terraces, and foot slopes of glaciated uplands. Slope is 0 to 8 percent.

These soils are fine, montmorillonitic Leptic Natriborolls.

Typical pedon of an Adger silty clay loam in an area of Adger-Absher complex, 0 to 8 percent slopes, in rangeland, 1,730 feet west and 250 feet south of the northeast corner of sec. 22, T. 24 N., R. 49 E.

A2—0 to 3 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; slightly effervescent; mildly alkaline; abrupt wavy boundary.

B21t—3 to 9 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure; hard, firm, sticky and plastic; many fine roots; many fine tubular pores; common thin clay films on horizontal and vertical faces of peds; strongly effervescent; strongly alkaline; clear wavy boundary.

B22t—9 to 16 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; strong coarse prismatic structure parting to strong medium subangular blocky; very hard, very firm, very sticky and very plastic; many fine roots; many fine tubular pores; many thick clay films on horizontal and vertical faces of peds; strongly effervescent; very strongly alkaline; clear wavy boundary.

B31tcacs—16 to 19 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak very coarse subangular blocky structure; hard, friable, sticky and plastic; many fine roots; common fine tubular pores; few faint clay films on vertical faces of peds; common faint lime coatings on vertical faces of peds; few fine and medium gypsum crystals; violently effervescent; very strongly alkaline; clear wavy boundary.

B32ca—19 to 27 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak very coarse subangular blocky structure; hard, friable, sticky and plastic; common fine roots; few fine tubular pores; common faint lime coatings on vertical faces of peds; violently effervescent; very strongly alkaline; gradual smooth boundary.

C1ca—27 to 38 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few fine roots; few fine tubular pores; common faint lime coatings on vertical faces of peds; violently

effervescent; very strongly alkaline; gradual smooth boundary.

C2ca—38 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky and plastic; few fine roots; common fine tubular pores; common faint lime coatings on vertical faces of peds; violently effervescent; very strongly alkaline.

The B2t horizon is strongly alkaline or very strongly alkaline. The B3 and C horizons are moderately alkaline to very strongly alkaline.

These soils are taxadjuncts to the Adger series because they are very strongly alkaline in the B2t horizon and they are silt loam below a depth of about 38 inches. These properties are outside the range of characteristics for the Adger series; they do not, however, significantly affect the use or management of these soils.

Alona Series

The Alona series consists of deep, well drained, moderately slowly permeable, salt- and sodium-affected soils that formed in alluvium. These soils are on fans and terraces. Slope is 0 to 15 percent.

These soils are fine-silty, mixed Borollic Camborthids.

Typical pedon of Alona silt loam, 0 to 8 percent slopes, in rangeland, 550 feet east and 1,900 feet south of the northwest corner of sec. 33, T. 19 N., R. 44 E.

A11—0 to 2 inches; grayish brown (2.5Y 5/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; common fine continuous tubular pores; moderately alkaline; clear smooth boundary.

A12—2 to 5 inches; grayish brown (2.5Y 5/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common fine tubular pores; moderately alkaline; clear wavy boundary.

B2—5 to 13 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; strongly alkaline; clear wavy boundary.

B3ca—13 to 22 inches; light gray (2.5Y 7/2) silty clay loam, brown (10YR 5/3) moist; moderate medium and coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; violently effervescent; very strongly alkaline; clear wavy boundary.

C1saca—22 to 54 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, friable, sticky and plastic; common fine roots; few fine tubular pores; many distinct lime coatings on horizontal and vertical faces of peds; many very fine salt crystals; strongly effervescent; very strongly alkaline; clear wavy boundary.

C2sa—54 to 60 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, sticky and plastic; many distinct lime coatings on horizontal and vertical faces of peds; many very fine salt crystals; strongly effervescent; very strongly alkaline.

The solum is 11 to 30 inches thick. The A horizon is neutral to moderately alkaline. The B2 horizon is moderately alkaline to very strongly alkaline. The B3 and C horizons are strongly alkaline or very strongly alkaline.

Banks Series

The Banks series consists of deep, excessively drained, rapidly permeable soils that formed in alluvium. These soils are on terraces and flood plains along the Missouri and Redwater Rivers. Slope is 0 to 2 percent.

These soils are sandy, mixed, frigid Typic Ustifluvents.

Typical pedon of Banks fine sandy loam in rangeland, 400 feet north and 2,640 feet east of the southwest corner of sec. 35, T. 21 N., R. 49 E.

A1—0 to 5 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; strongly effervescent; mildly alkaline; gradual wavy boundary.

C1—5 to 16 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; strongly effervescent; mildly alkaline; gradual wavy boundary.

IIC2—16 to 60 inches; light brownish gray (2.5Y 6/2) loamy fine sand, olive brown (2.5Y 4/4) moist; single grain; loose; few fine roots; strongly effervescent; mildly alkaline.

The C horizon is mildly alkaline or moderately alkaline. It has one or more very thin strata of very fine sandy loam or fine sandy loam.

Barkof Series

The Barkof series consists of moderately deep, well drained, slowly permeable soils that formed in residual material derived from semiconsolidated shale. These soils are on uplands. Slope is 2 to 45 percent.

These soils are fine, montmorillonitic, frigid Udorthentic Chromusterts.

Typical pedon of Barkof silty clay, 2 to 8 percent slopes, in cropland, 1,350 feet west and 75 feet south of the northeast corner of sec. 15, T. 20 N., R. 47 E.

Ap1—0 to 3 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure parting to moderate very fine and fine angular blocky; hard, friable, sticky and plastic; many fine roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

Ap2—3 to 7 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

B2—7 to 20 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; many fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

B3ca—20 to 26 inches; light olive gray (5Y 6/2) silty clay, olive gray (5Y 5/2) moist; moderate coarse prismatic structure; hard, firm, sticky and plastic; common fine roots between peds; common soft medium and coarse masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C1ca—26 to 29 inches; light gray (5Y 7/1) silty clay, light olive gray (5Y 6/2) moist; massive; hard, firm, sticky and plastic; few fine roots in cracks; few soft fine and medium masses of lime; slightly effervescent; moderately alkaline; gradual wavy boundary.

C2rcs—29 to 34 inches; light gray (5Y 7/1) semiconsolidated shale that crushes to silty clay, light olive gray (5Y 6/2) moist; very hard, firm, sticky and plastic; common fine roots in cracks and along bedding planes; few fine masses of gypsum crystals along bedding planes; mildly alkaline; gradual wavy boundary.

C3rcs—34 to 60 inches; white (5Y 8/1) semiconsolidated shale that crushes to silty clay, light olive gray (5Y 6/2) moist; very hard, firm, sticky and plastic; few fine masses of gypsum crystals along bedding planes; moderately alkaline.

Semiconsolidated shale is at a depth of 20 to 40 inches. The control section is silty clay or clay. When these soils are dry, cracks extend from the surface to a depth of 20 to 40 inches. The B horizon is silty clay or clay.

Bascovy Series

The Bascovy series consists of moderately deep, well drained, very slowly permeable soils that formed in material derived from consolidated shale. These soils are on knolls, side slopes, and foot slopes of hills of uplands. Slope is 2 to 25 percent.

These soils are fine, montmorillonitic, frigid Udorthentic Chromusterts.

Typical pedon of a Bascovy silty clay in an area of Bascovy-Sunburst complex, 15 to 45 percent slopes, in rangeland, 2,200 feet west and 1,960 feet south of the northeast corner of sec. 14, T. 26 N., R. 41 E.

A1—0 to 2 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate very fine angular blocky structure; hard, friable, sticky and plastic; many fine roots; slightly acid; clear wavy boundary.

B2—2 to 11 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; very hard, firm, very sticky and very plastic; many fine roots; neutral; gradual wavy boundary.

C1—11 to 23 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and plastic; common fine roots in cracks; 45 percent soft shale fragments; neutral; gradual smooth boundary.

C2r—23 to 47 inches; olive gray (5Y 5/2) consolidated shale, very dark gray (5Y 3/1) moist; strongly acid; clear smooth boundary.

C3r—47 to 62 inches; gray (5Y 5/1) consolidated shale, very dark gray (5Y 3/1) moist; strongly acid.

Consolidated shale is at a depth of 20 to 40 inches. The control section is clay or silty clay. When these soils are dry, cracks extend from the surface to a depth of 20 to 40 inches. The profile is mildly alkaline to slightly acid. The B horizon is clay or silty clay and in some pedons has as much as 25 percent soft shale fragments. The C horizon has as much as 50 percent soft shale fragments in the lower part. The Cr horizon is medium acid or strongly acid.

Benz Series

The Benz series consists of deep, well drained, slowly permeable, salt- and sodium-affected soils that formed in alluvium. These soils are on fans and terraces below sandstone and shale outcroppings. Slope is 0 to 8 percent.

These soils are fine-loamy, mixed (calcareous), frigid Ustic Torriorthents.

Typical pedon of Benz clay loam, 0 to 8 percent slopes, in rangeland, 1,020 feet east and 2,340 feet north of the southwest corner of sec. 23, T. 23 N., R. 43 E.

A1—0 to 1 inch; light brownish gray (2.5Y 6/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; slightly effervescent; strongly alkaline; clear wavy boundary.

C1—1 inch to 9 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive;

hard, friable, sticky and plastic; slightly effervescent; very strongly alkaline; clear wavy boundary.

C2casa—9 to 60 inches; grayish brown (2.5Y 5/2) stratified clay loam and fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; 5 percent pebbles; slightly effervescent; very strongly alkaline.

The 10- to 40-inch control section averages loam or clay loam. The A horizon is moderately alkaline or strongly alkaline. The C horizon is strongly alkaline or very strongly alkaline.

Blanchard Series

The Blanchard series consists of deep, excessively drained, rapidly permeable soils that formed in sandy eolian and alluvial material. These soils are in swales and on foot slopes and side slopes of uplands. Slope is 2 to 25 percent.

These soils are mixed, frigid Typic Ustipsamments.

Typical pedon of a Blanchard loamy sand in an area of Dast-Blanchard complex, 8 to 25 percent slopes, in rangeland, 700 feet north and 2,340 feet east of the southwest corner of sec. 16, T. 20 N., R. 46 E.

A1—0 to 7 inches; grayish brown (2.5Y 5/2) loamy sand, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; slightly effervescent; neutral; clear smooth boundary.

C1—7 to 18 inches; grayish brown (2.5Y 5/2) loamy sand, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; strongly effervescent; mildly alkaline; clear wavy boundary.

C2—18 to 36 inches; light brownish gray (2.5Y 6/2) loamy sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; strongly effervescent; mildly alkaline; clear wavy boundary.

IIC3—36 to 60 inches; light yellowish brown (2.5Y 6/4) loamy coarse sand, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; strongly effervescent; mildly alkaline.

The 10- to 40-inch control section is loamy fine sand to loamy coarse sand.

Bowbells Series

The Bowbells series consists of deep, well drained, moderately slowly permeable soils that formed in glacial till and local alluvium. These soils are in broad, nearly level basins, in swales, and on glaciated uplands. Slope is 0 to 2 percent.

These soils are fine-loamy, mixed Pachic Argiborolls.

Typical pedon of Bowbells loam, 0 to 2 percent slopes, in cropland, 1,100 feet east and 1,350 feet south of the northwest corner of sec. 30, T. 25 N., R. 50 E.

Ap1—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; mildly alkaline; abrupt smooth boundary.

Ap2—5 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; mildly alkaline; abrupt smooth boundary.

B1—10 to 18 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; mildly alkaline; clear wavy boundary.

B2t—18 to 28 inches; dark grayish brown (2.5Y 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; many fine roots; common thin clay films on vertical faces of peds; mildly alkaline; clear wavy boundary.

B3ca—28 to 37 inches; light brownish gray (2.5Y 6/2) heavy loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure; hard, friable, sticky and plastic; common fine roots; common distinct lime coatings on vertical faces of peds; 5 percent pebbles that have common distinct lime coatings; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—37 to 47 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; common fine roots; common threadlike masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—47 to 60 inches; light gray (10YR 7/1) clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; common distinct lime coatings on vertical faces of peds; 5 percent pebbles; common threadlike masses of lime; strongly effervescent; moderately alkaline.

The mollic epipedon is 19 to 28 inches thick. The B1 and B2t horizons are loam or clay loam.

Brandenburg Series

The Brandenburg series consists of deep, excessively drained soils that are moderately permeable in the upper

part and very rapidly permeable in the lower part. These soils formed in material derived from shattered porcellanite and are on ridges and hills of uplands. Slope is 8 to 45 percent.

These soils are fragmental, mixed, frigid Typic Ustorthents.

Typical pedon of a Brandenburg channery loam in an area of Cabba-Brandenburg complex, 8 to 45 percent slopes, in rangeland, 200 feet north and 1,000 feet west of the southeast corner of sec. 9, T. 19 N., R. 49 E.

A1—0 to 5 inches; brown (7.5YR 5/2) channery loam, brown (7.5YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; 25 percent porcellanite fragments; slightly effervescent; mildly alkaline; clear smooth boundary.

C1ca—5 to 10 inches; brown (7.5YR 5/2) very channery loam, brown (7.5YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; 55 percent porcellanite fragments; many distinct white lime coatings on lower surfaces of fragments; violently effervescent; mildly alkaline; abrupt smooth boundary.

C2ca—10 to 60 inches; reddish yellow (5YR 6/6) shattered porcellanite; few fine roots in cracks; common distinct lime coatings on lower surfaces of fragments.

Depth to shattered porcellanite is 10 to 20 inches. The C1 horizon is channery loam or very channery loam.

Bryant Series

The Bryant series consists of deep, well drained, moderately permeable soils that formed in alluvium and in material derived from weakly consolidated sedimentary beds. These soils are on fans, terraces, and foot slopes of low hills of uplands. Slope is 0 to 8 percent.

These soils are fine-silty, mixed Typic Haploborolls.

Typical pedon of Bryant silt loam, 0 to 4 percent slopes, in rangeland, 1,025 feet east and 780 feet south of the northwest corner of sec. 28, T. 20 N., R. 46 E.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; neutral; clear smooth boundary.

B1—4 to 9 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; neutral; clear wavy boundary.

B2—9 to 14 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; clear wavy boundary.

B3ca—14 to 24 inches; light brownish gray (2.5Y 6/2) silty clay loam, olive brown (2.5Y 4/4) moist; moderate medium and coarse prismatic structure; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common threadlike masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

C1ca—24 to 48 inches; light gray (2.5Y 7/2) silty clay loam, light yellowish brown (2.5Y 6/4) moist; weak coarse prismatic structure; hard, very friable, sticky and plastic; common fine roots; many fine tubular pores; many threadlike masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

C2—48 to 60 inches; light yellowish brown (2.5Y 6/4) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; hard, very friable, sticky and plastic; few fine roots; many fine tubular pores; strongly effervescent; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. The 10- to 40-inch control section is silt loam or silty clay loam and is 18 to 35 percent clay. The A horizon is neutral or mildly alkaline. The B horizon is silt loam or silty clay loam. The B1 and B2 horizons are neutral to moderately alkaline, and the B3 horizon is mildly alkaline or moderately alkaline. The C horizon is silt loam or silty clay loam.

Bryant Variant

Bryant Variant consists of deep, moderately well drained, salt-affected soils that formed in alluvium. These soils are on stream terraces. Slope is 0 to 2 percent.

These soils are fine-silty, mixed Typic Haploborolls.

Typical pedon of Bryant Variant silt loam, 0 to 2 percent slopes, in rangeland, 1,660 feet west and 2,400 feet south of the northeast corner of sec. 25, T. 22 N., R. 47 E.

Ap1sa—0 to 6 inches; dark grayish brown (2.5Y 4/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many fine roots; few medium masses of salt crystals; mildly alkaline; abrupt smooth boundary.

Ap2sa—6 to 10 inches; dark grayish brown (2.5Y 4/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many fine roots; common fine tubular pores; few medium

masses of salt crystals; strongly effervescent; moderately alkaline; clear wavy boundary.

B21sa—10 to 15 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and slightly plastic; many fine roots; many fine tubular pores; few medium masses of salt crystals; violently effervescent; moderately alkaline; clear wavy boundary.

B22sa—15 to 20 inches; light brownish gray (2.5Y 6/2) silty clay loam, light brownish gray (2.5Y 6/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common fine and medium masses of salt crystals; violently effervescent; strongly alkaline; clear wavy boundary.

B23sa—20 to 24 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common medium masses of salt crystals; violently effervescent; strongly alkaline; clear wavy boundary.

C1sa—24 to 33 inches; light brownish gray (2.5Y 6/2) silt loam, olive (5Y 4/3) moist; weak coarse prismatic structure; slightly hard, friable, sticky and plastic; common fine roots; many fine tubular pores; few medium masses of salt crystals; violently effervescent; strongly alkaline; clear wavy boundary.

C2sa—33 to 42 inches; light gray (2.5Y 7/2) silty clay loam, olive (5Y 5/3) moist; massive; hard, firm, sticky and plastic; common fine roots; common fine tubular pores; many medium and coarse masses of salt crystals; violently effervescent; moderately alkaline; clear wavy boundary.

C3sa—42 to 60 inches; light gray (2.5Y 7/2) silty clay loam, olive (5Y 5/3) moist; few fine faint white mottles; massive; very hard, firm, sticky and plastic; few fine roots; common fine tubular pores; common medium and coarse masses of salt crystals; strongly effervescent; moderately alkaline.

Depth to a seasonal water table is 48 to 72 inches. Electrical conductivity is more than 8 millimhos per centimeter from the surface to a depth of about 42 inches.

Busby Series

The Busby series consists of deep, well drained, moderately rapidly permeable soils that formed in sandy alluvium. These soils are on fans, foot slopes, side slopes, and tops of low hills of uplands. Slope is 0 to 35 percent.

These soils are coarse-loamy, mixed Borollic Camborthids.

Typical pedon of Busby fine sandy loam, 2 to 8 percent slopes, in rangeland, 2,370 feet south and 1,580 feet east of the northwest corner of sec. 17, T. 17 N., R. 45 E.

A1—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

B2—5 to 11 inches; light olive brown (2.5Y 5/4) fine sandy loam, olive brown (2.5Y 4/4) moist; weak medium and coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—11 to 26 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; common distinct light gray lime coatings on sand and gravel; few sandstone fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—26 to 60 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; moderately alkaline.

The B2 and B3 horizons, where present, are sandy loam or fine sandy loam. The C horizon is fine sandy loam or sandy loam.

Cabba Series

The Cabba series consists of shallow, well drained, moderately permeable soils that formed in material derived from weakly consolidated, sandy and silty sedimentary beds. These soils are on the sides and tops of hills and ridges of uplands. Slope is 4 to 45 percent.

These soils are loamy, mixed (calcareous), frigid, shallow Typic Ustorthents.

Typical pedon of a Cabba loam in an area of Cambert-Cabba loams, 8 to 15 percent slopes, in cropland, 1,200 feet west and 2,320 feet south of the northeast corner of sec. 8, T. 21 N., R. 47 E.

Ap—0 to 5 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—5 to 10 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; massive; slightly

hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—10 to 15 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; common soft threadlike masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C3r—15 to 21 inches; pale yellow (5Y 7/3) weakly consolidated sedimentary beds that crush to silt loam, olive (5Y 5/3) moist; hard, friable, slightly sticky and slightly plastic; common fine roots in cracks and along bedding planes; strongly effervescent; moderately alkaline; gradual wavy boundary.

C4r—21 to 36 inches; pale yellow (5Y 7/4) weakly consolidated sandy sedimentary beds that crush to loam, olive (5Y 5/4) moist; very hard, friable, slightly sticky and slightly plastic; few fine roots in cracks and along bedding planes; strongly effervescent; moderately alkaline; gradual wavy boundary.

C5r—36 to 48 inches; pale yellow (5Y 7/4) weakly consolidated sedimentary beds that crush to silt loam, olive (5Y 5/4) moist; very hard, firm, slightly sticky and slightly plastic; few fine roots in cracks and along bedding planes; strongly effervescent; moderately alkaline; gradual wavy boundary.

C6r—48 to 60 inches; brownish yellow (10YR 6/6) weakly consolidated sedimentary beds that crush to loam, yellowish brown (10YR 5/6) moist; very hard, firm, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline.

Weakly consolidated, silty and sandy sedimentary beds are at a depth of 10 to 20 inches. The C horizon is loam, silt loam, or silty clay loam. It is moderately alkaline or strongly alkaline.

Cabbart Series

The Cabbart series consists of shallow, well drained, moderately permeable soils that formed in material derived from weakly consolidated, sandy and silty sedimentary beds. These soils are on side slopes, ridges, and tops of hills on uplands. Slope is 8 to 45 percent.

These soils are loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents.

Typical pedon of a Cabbart silt loam in an area of Cambeth-Cabbart silt loams, 8 to 15 percent slopes, in rangeland, 350 feet west and 1,650 feet south of the northeast corner of sec. 18, T. 21 N., R. 44 E.

A1—0 to 4 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine roots; violently effervescent; moderately alkaline; clear wavy boundary.

C1—4 to 13 inches; pale olive (5Y 6/3) silt loam, olive (5Y 5/3) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; violently effervescent; moderately alkaline; clear wavy boundary.

C2r—13 to 60 inches; pale yellow (5Y 7/3) weakly consolidated sandy and silty sedimentary beds, pale olive (5Y 6/3) moist; strata are mainly less than 6 inches thick; material crushes to silt loam to very fine sandy loam but dominantly to loam; slightly hard, very friable, slightly sticky and nonplastic; few roots in cracks and along bedding planes; violently effervescent; moderately alkaline.

Weakly consolidated sedimentary beds are at a depth of 10 to 20 inches. The C horizon averages silt loam but ranges from silty clay loam to very fine sandy loam.

Cambert Series

The Cambert series consists of moderately deep, well drained, moderately permeable soils that formed in material derived from weakly consolidated, silty sedimentary beds. These soils are on foot slopes and knolls of low hills on uplands. Slope is 2 to 15 percent.

These soils are fine-silty, mixed, frigid Typic Ustochrepts.

Typical pedon of Cambert loam, 2 to 8 percent slopes, in rangeland, 210 feet south and 120 feet west of the northeast corner of sec. 35, T. 19 N., R. 48 E.

A1—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; mildly alkaline; clear smooth boundary.

B21—4 to 9 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; moderately alkaline; clear smooth boundary.

B22—9 to 13 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; slightly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—13 to 26 inches; very pale brown (10YR 7/4) silty clay loam, light yellowish brown (2.5Y 6/4) moist; weak fine and medium angular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; many soft fine

masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

C2r—26 to 38 inches; pale yellow (2.5Y 7/4) weakly consolidated sedimentary beds that crush to silt, light olive brown (2.5Y 5/4) moist; hard, friable, sticky and plastic; common fine and very fine roots in cracks and along bedding planes; common fine tubular pores; strongly effervescent; strongly alkaline; abrupt smooth boundary.

C3r—38 to 45 inches; light gray (2.5Y 7/2) weakly consolidated sedimentary beds that crush to very fine sandy loam, grayish brown (2.5Y 5/2) moist; slightly hard, friable, nonsticky and nonplastic; few fine roots in cracks and along bedding planes; few fine tubular pores; strongly effervescent; strongly alkaline; abrupt smooth boundary.

C4r—45 to 54 inches; light gray (2.5Y 7/2) weakly consolidated sedimentary beds that crush to silt, grayish brown (2.5Y 5/2) moist; hard, friable, slightly sticky and slightly plastic; few fine roots in cracks and along bedding planes; few fine tubular pores; strongly effervescent; strongly alkaline; gradual smooth boundary.

C5r—54 to 60 inches; light gray (2.5Y 7/2) weakly consolidated sedimentary beds that crush to silt loam, grayish brown (2.5Y 5/2) moist; hard, friable, nonsticky and nonplastic; few very fine roots in cracks and along bedding planes; strongly effervescent; strongly alkaline.

Weakly consolidated sedimentary beds are at a depth of 20 to 40 inches. The B horizon is loam or silt loam.

Cambeth Series

The Cambeth series consists of moderately deep, well drained, moderately permeable soils that formed in material derived from weakly consolidated, silty sedimentary beds. These soils are on foot slopes, side slopes, and tops of hills on uplands. Slope is 0 to 15 percent.

These soils are fine-silty, mixed, Borollic Camborthids.

Typical pedon of Cambeth silt loam, 2 to 8 percent slopes, in rangeland, 1,200 feet east and 600 feet north of the southwest corner of sec. 36, T. 19 N., R. 43 E.

A11—0 to 3 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; neutral; clear smooth boundary.

A12—3 to 6 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, nonsticky and nonplastic; many fine roots; many fine tubular pores; mildly alkaline; clear smooth boundary.

B2—6 to 11 inches; light yellowish brown (10YR 6/4) silt loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure parting to moderate medium angular blocky; hard, firm, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; strongly effervescent; mildly alkaline; clear smooth boundary.

B3ca—11 to 13 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure parting to weak medium angular blocky; hard, firm, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; few soft threadlike masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.

C1ca—13 to 35 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; few soft threadlike masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.

C2r—35 to 60 inches; white (10YR 8/1) weakly consolidated sedimentary beds that crush to silty clay loam, light gray (10YR 6/1) moist; slightly hard, friable, sticky and slightly plastic; few fine roots in cracks and along bedding planes; common fine tubular pores; violently effervescent; strongly alkaline.

Weakly consolidated, silty sedimentary beds are at a depth of 20 to 40 inches. The B horizon is silt loam or loam. The C horizon is silt loam or silty clay loam.

Cherry Series

The Cherry series consists of deep, well drained, moderately slowly permeable soils that formed in alluvium. These soils are on fans and terraces of uplands. Slope is 0 to 4 percent.

These soils are fine-silty, mixed, frigid Typic Ustochrepts.

Typical pedon of Cherry silt loam, 0 to 4 percent slopes, in rangeland, 100 feet east and 2,480 feet north of the southwest corner of sec. 21, T. 19 N., R. 48 E.

A1—0 to 3 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

B21—3 to 8 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; common fine tubular pores; strongly effervescent; moderately alkaline; clear wavy boundary.

B22—8 to 17 inches; pale yellow (2.5Y 7/4) silt loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; clear wavy boundary.

B3ca—17 to 24 inches; light brownish gray (2.5Y 6/2) silt loam, olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure; slightly hard, very friable, sticky and plastic; many fine roots; many fine tubular pores; violently effervescent; moderately alkaline; clear wavy boundary.

C1ca—24 to 39 inches; pale yellow (2.5Y 7/4) silt loam, olive brown (2.5Y 4/4) moist; weak coarse prismatic structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; common firm threadlike masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

C2—39 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; few threadlike masses of lime; strongly effervescent; strongly alkaline.

The 10- to 40-inch control section is silt loam or silty clay loam and is 18 to 35 percent clay. The B and C horizons are silt loam or silty clay loam.

Chinook Series

The Chinook series consists of deep, well drained, moderately rapidly permeable soils that formed in alluvial and eolian material. These soils are on fans, terraces, and foot slopes of hills on uplands. Slope is 0 to 15 percent.

These soils are coarse-loamy, mixed Aridic Haploborolls.

Typical pedon of Chinook fine sandy loam, 4 to 8 percent slopes, in rangeland, 1,580 feet north and 1,600 feet east of the southwest corner of sec. 26, T. 21 N., R. 43 E.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine roots; neutral; clear smooth boundary.

B21—6 to 13 inches; brown (10YR 4/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many fine roots; mildly alkaline; clear wavy boundary.

B22—13 to 18 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; moderate medium and coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

B3ca—18 to 29 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; common fine roots; common distinct white lime coatings on faces of peds; common thick white lime coatings on sand grains and pebbles; 5 percent soft sandstone pebbles; violently effervescent; moderately alkaline; clear wavy boundary.

C1ca—29 to 42 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; common fine roots; common distinct white lime coatings on sand grains and pebbles; 5 percent soft sandstone pebbles; violently effervescent; moderately alkaline; gradual irregular boundary.

C2ca—42 to 60 inches; grayish brown (2.5Y 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common distinct lime coatings on sand grains and pebbles; 5 percent soft sandstone pebbles; strongly effervescent; moderately alkaline.

The mollic epipedon is 7 to 13 inches thick. The B2 and B3 horizons are fine sandy loam or sandy loam. The C horizon is sandy loam or loamy fine sand.

Creed Series

The Creed series consists of deep, well drained, slowly permeable soils that formed in alluvium. These soils are on fans and terraces of uplands. Slope is 0 to 8 percent.

These soils are fine, montmorillonitic Borollic Natrargids.

Typical pedon of a Creed loam in an area of Creed-Gerdrum complex, 0 to 8 percent slopes, in rangeland, 1,970 feet east and 55 feet north of the southwest corner of sec. 19, T. 21 N., R. 45 E.

A1—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, sticky and slightly plastic; many fine roots; mildly alkaline; abrupt smooth boundary.

A21—3 to 6 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure; slightly hard, friable, sticky and plastic; many fine roots; many fine vesicular pores; common fine tubular pores; moderately alkaline; clear smooth boundary.

A22—6 to 8 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak

medium subangular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; many fine vesicular pores; moderately alkaline; abrupt wavy boundary.

B2tca—8 to 24 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; strong medium columnar structure parting to moderate medium subangular blocky; very hard, firm, very sticky and plastic; many fine roots; many fine tubular pores; many fine vesicular pores; common thin clay films on horizontal and vertical faces of peds; common distinct lime coatings on horizontal and vertical faces of peds; 5 percent pebbles; common threadlike masses of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

C1ca—24 to 42 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak very coarse subangular blocky structure; very hard, firm, very sticky and plastic; few fine roots; common fine vesicular pores; few distinct lime coatings on horizontal and vertical faces of peds; common distinct lime coatings on lower surfaces of fragments; 5 percent pebbles; common threadlike masses of lime; strongly effervescent; strongly alkaline; diffuse smooth boundary.

C1ca—42 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak very coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; few fine tubular pores; common distinct lime coatings on lower surfaces of fragments; 5 percent pebbles; strongly effervescent; strongly alkaline.

The A horizon is neutral to moderately alkaline. The B2t horizon is moderately alkaline or strongly alkaline. The B3 horizon, where present, and the C horizon are clay loam, silty clay, or silty clay loam and are moderately alkaline or strongly alkaline.

Dast Series

The Dast series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in material derived from weakly consolidated, sandy sedimentary beds. These soils are on uplands. Slope is 0 to 45 percent.

These soils are coarse-loamy, mixed (calcareous), frigid Typic Ustorthents.

Typical pedon of a Dast fine sandy loam in an area of Cambert-Dast-Cabba complex, 4 to 15 percent slopes, in rangeland, 400 feet north and 150 feet west of the southeast corner of sec. 3, T. 22 N., R. 47 E.

A1—0 to 3 inches; brown (10YR 4/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine roots; common fine tubular pores; strongly effervescent; moderately alkaline; clear wavy boundary.

C1—3 to 9 inches; brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/3) moist; weak medium and coarse prismatic structure parting to moderate medium subangular blocky; soft, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; 5 percent soft pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—9 to 17 inches; very pale brown (10YR 7/3) fine sandy loam, light yellowish brown (2.5Y 6/4) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; 5 percent soft pebbles; violently effervescent; moderately alkaline; gradual wavy boundary.

C3—17 to 25 inches; light gray (2.5Y 7/2) fine sandy loam, light yellowish brown (2.5Y 6/4) moist; massive; soft, friable, nonsticky and nonplastic; common fine roots; many fine tubular pores; 20 percent soft pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

C4r—25 to 60 inches; pale yellow (5Y 7/3) weakly consolidated sandy sedimentary beds that crush to fine sandy loam, pale olive (5Y 6/4) moist; slightly hard, friable, nonsticky and nonplastic; few fine roots in cracks and along bedding planes; strongly effervescent; moderately alkaline.

Weakly consolidated, sandy sedimentary beds are at a depth of 20 to 40 inches. The C horizon is fine sandy loam or sandy loam.

Dimmick Series

The Dimmick series consists of deep, very poorly drained, very slowly permeable soils that formed in clayey alluvium. These soils are in large basins and lakebeds on uplands and in oxbows along the Missouri River. Slope is 0 to 1 percent.

These soils are fine, montmorillonitic, frigid Typic Haplaquolls.

Typical pedon of Dimmick silty clay in rangeland, 2,360 feet east and 1,260 feet north of the southwest corner of sec. 10, T. 26 N., R. 43 E.

A11g—0 to 1 inch; gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) moist; common medium distinct yellow (2.5Y 7/6) mottles; many medium distinct dark gray (5Y 4/1) mottles; moderate medium platy structure; hard, friable, very sticky and very plastic; many fine roots; mildly alkaline; abrupt smooth boundary.

A12g—1 inch to 7 inches; gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) moist; many fine and medium distinct dark gray (5Y 4/1) mottles; moderate very fine and fine subangular blocky structure; hard,

friable, sticky and plastic; many fine roots; mildly alkaline; clear wavy boundary.

C1g—7 to 28 inches; gray (5Y 5/1) silty clay, dark olive gray (5Y 3/2) moist; common fine and medium distinct very dark gray (5Y 3/1) mottles; strong fine subangular blocky structure; very hard, friable, sticky and very plastic; common fine roots; moderately alkaline; gradual wavy boundary.

C2g—28 to 60 inches; olive gray (5Y 5/2) silty clay, dark olive gray (5Y 3/2) moist; common fine and medium distinct dark gray (5Y 4/1) mottles; massive; very hard, firm, very sticky and very plastic; slightly effervescent; moderately alkaline.

The profile is clay or silty clay throughout. Some pedons have a few thin lenses of clay loam.

Ethridge Series

The Ethridge series consists of deep, well drained, slowly permeable soils that formed in alluvium. These soils are on terraces and fans of uplands. Slope is 0 to 8 percent.

These soils are fine, montmorillonitic Aridic Argiborolls.

Typical pedon of Ethridge silty clay loam, 4 to 8 percent slopes, in rangeland, 2,590 feet north and 2,440 feet east of the southwest corner of sec. 1, T. 21 N., R. 44 E.

A1—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium and coarse subangular blocky structure parting to moderate fine and medium granular; slightly hard, friable, sticky and plastic; many fine and medium roots; many fine and medium tubular pores; mildly alkaline; clear wavy boundary.

B2t—3 to 11 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; many thin very dark grayish brown (10YR 3/2) clay films on vertical faces of peds; moderately alkaline; clear wavy boundary.

B3ca—11 to 33 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium prismatic structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; many fine roots; many fine tubular pores; many threadlike masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—33 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few fine roots; many fine tubular pores; many threadlike masses of lime; violently effervescent; moderately alkaline.

The mollic epipedon is 7 to 13 inches thick. The B2t horizon is silty clay loam or silty clay. The C horizon is silty clay loam or silty clay and has thin strata of very fine sandy loam or silt loam.

Evanston Series

The Evanston series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on terraces and fans of uplands. Slope is 0 to 8 percent.

These soils are fine-loamy, mixed Aridic Argiborolls.

Typical pedon of Evanston loam, 0 to 2 percent slopes, in cropland, 1,200 feet south and 2,035 feet west of the northeast corner of sec. 17, T. 25 N., R. 44 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; many fine roots; neutral; clear smooth boundary.

B21t—8 to 15 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse prismatic structure parting to strong medium angular blocky; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common thin very dark grayish brown (10YR 3/2) clay films on horizontal and vertical faces of peds; neutral; gradual wavy boundary.

B22t—15 to 26 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure parting to strong medium and coarse angular blocky; hard, friable, sticky and plastic; common fine roots; many fine continuous tubular pores; common thin clay films on horizontal and vertical faces of peds; neutral; clear wavy boundary.

C1ca—26 to 52 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few fine roots; many soft medium and coarse masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—52 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few fine roots; many soft fine and medium masses of lime; violently effervescent; strongly alkaline.

The mollic epipedon is 11 to 15 inches thick. The B2t horizon is neutral or mildly alkaline. The C horizon is sandy loam to clay loam.

Farland Series

The Farland series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on fans and terraces of uplands. Slope is 0 to 4 percent.

These soils are fine-silty, mixed Typic Argiborolls.

Typical pedon of Farland silt loam, 0 to 4 percent slopes, in rangeland, 1,575 feet north and 1,600 feet west of the southeast corner of sec. 25, T. 19 N., R. 46 E.

A11—0 to 2 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; neutral; abrupt smooth boundary.

A12—2 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; neutral; clear wavy boundary.

B2t—4 to 15 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium and coarse prismatic structure parting to moderate medium angular blocky; hard, firm, sticky and plastic; many fine roots; many fine tubular pores; many thin clay films on horizontal and vertical faces of peds; mildly alkaline; clear wavy boundary.

B3ca—15 to 30 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common threadlike masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C1—30 to 40 inches; light gray (2.5Y 7/2) silt loam, olive brown (2.5Y 4/4) moist; weak coarse prismatic structure; slightly hard, very friable, sticky and plastic; many fine roots; many fine tubular pores; many fine vesicular pores; slightly effervescent; moderately alkaline; gradual wavy boundary.

C2—40 to 60 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, sticky and plastic; few fine roots; common fine tubular pores; many fine vesicular pores; slightly effervescent; moderately alkaline.

Thickness of the mollic epipedon is 12 to 15 inches. Depth to carbonates is 17 to 26 inches. The B3ca horizon is silt loam or silty clay loam.

Farnuf Series

The Farnuf series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on fans and terraces of uplands. Slope is 0 to 4 percent.

These soils are fine-loamy, mixed Typic Argiborolls.

Typical pedon of Farnuf loam, 0 to 4 percent slopes, in cropland, 800 feet west and 550 feet south of the northeast corner of sec. 24, T. 17 N., R. 49 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine roots; common very fine tubular pores; neutral; clear smooth boundary.

B2t—6 to 15 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to strong medium angular blocky; hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; common thin clay films on faces of peds; neutral; gradual wavy boundary.

B3—15 to 24 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; hard, friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; slightly effervescent; mildly alkaline; gradual wavy boundary.

C1ca—24 to 42 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; weak very coarse prismatic structure; slightly hard, very friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; many soft fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—42 to 60 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; violently effervescent; moderately alkaline.

The mollic epipedon is 14 or 15 inches thick. Depth to carbonates is 10 to 15 inches. The A horizon is neutral or mildly alkaline. The B2t horizon is neutral to moderately alkaline. The B3 and C horizons are clay loam or loam.

Fleak Series

The Fleak series consists of shallow, somewhat excessively drained, rapidly permeable soils that formed in material derived from weakly consolidated, sandy sedimentary beds. These soils are on uplands. Slope is 2 to 45 percent.

These soils are mixed, frigid, shallow Typic Torripsamments.

Typical pedon of a Fleak loamy sand in an area of Busby-Fleak complex, 15 to 45 percent slopes, in

rangeland, 1,655 feet south and 475 feet east of the northwest corner of sec. 7, T. 25 N., R. 43 E.

A11—0 to 3 inches; olive brown (2.5Y 4/4) sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many fine roots; 5 percent soft pebbles; slightly effervescent; neutral; clear wavy boundary.
A12—3 to 6 inches; light olive brown (2.5Y 5/4) loamy sand, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; soft, very friable; many fine roots; 5 percent soft pebbles; slightly effervescent; neutral; gradual wavy boundary.
C1—6 to 16 inches; olive (5Y 5/3) loamy sand, olive (5Y 4/3) moist; weak medium subangular blocky structure; soft, very friable; many fine roots; 5 percent soft pebbles; slightly effervescent; mildly alkaline; gradual wavy boundary.
C2r—16 to 35 inches; light olive gray (5Y 6/2) weakly consolidated sedimentary beds that crush to loamy sand, olive (5Y 4/3) moist; slightly hard, very friable; few fine roots in cracks and along bedding planes; slightly effervescent; mildly alkaline; gradual wavy boundary.
C3r—35 to 60 inches; light olive brown (2.5Y 5/4) weakly consolidated sedimentary beds that crush to loamy sand, olive brown (2.5Y 4/4) moist; slightly hard, very friable; slightly effervescent; mildly alkaline.

Weakly consolidated, sandy sedimentary beds are at a depth of 10 to 20 inches.

Floweree Series

The Floweree series consists of deep, well drained, moderately slowly permeable soils that formed in alluvium. They are on fans and terraces of uplands. Slope is 0 to 8 percent.

These soils are fine-silty, mixed Aridic Haploborolls.

Typical pedon of Floweree silt loam, 0 to 4 percent slopes, in rangeland, 500 feet south and 500 feet east of the northwest corner of sec. 16, T. 16 N., R. 46 E.

A1—0 to 2 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to weak fine granular; slightly hard, friable, sticky and plastic; many fine roots; many fine pores; moderately alkaline; clear smooth boundary.
B21—2 to 6 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; strong medium and coarse prismatic structure parting to strong medium subangular blocky; hard, very friable, sticky and plastic; many fine roots; many fine tubular pores; moderately alkaline; clear smooth boundary.
B22—6 to 10 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; strong medium and coarse prismatic structure parting to strong medium subangular blocky; slightly hard, very friable, sticky and plastic; many fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.
B23ca—10 to 15 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; few threadlike masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.
C1ca—15 to 20 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; few threadlike masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.
C2—20 to 37 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; violently effervescent; strongly alkaline; gradual smooth boundary.
C3cs—37 to 60 inches; grayish brown (10YR 5/2) silty clay loam, brown (10YR 4/3) moist; massive; very hard, friable, sticky and plastic; common threadlike masses of gypsum; slightly effervescent; moderately alkaline.

The B horizon is silt loam, silty clay loam, or clay loam. The C horizon is loam, silt loam, or silty clay loam.

Gerdrum Series

The Gerdrum series consists of deep, well drained, slowly permeable, salt- and sodium-affected soils that formed in alluvium. These soils are on fans, terraces, and foot slopes of uplands. Slope is 0 to 15 percent.

These soils are fine, montmorillonitic Borollic Natrargids.

Typical pedon of Gerdrum clay loam, 0 to 8 percent slopes, in rangeland, 1,700 feet north and 2,110 feet east of the southwest corner of sec. 8, T. 26 N., R. 42 E.

A2—0 to 2 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate fine platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine and medium vesicular pores; neutral; clear smooth boundary.
B21t—2 to 4 inches; light brownish gray (2.5Y 6/2) heavy clay loam, dark grayish brown (2.5Y 4/2) moist; strong medium columnar structure parting to

strong medium angular blocky; very hard, firm, very sticky and plastic; many fine roots; many fine tubular pores; common thin dark grayish brown (10YR 4/2) clay films on vertical faces of peds; 5 percent pebbles; moderately alkaline; clear wavy boundary.

B22t—4 to 7 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong medium prismatic structure parting to strong medium and coarse angular blocky; very hard, very firm, very sticky and very plastic; common fine roots; many fine tubular pores; many thin clay films on horizontal and vertical faces of peds; mildly alkaline; gradual wavy boundary.

B23tca—7 to 11 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium and coarse prismatic structure parting to strong medium and coarse angular blocky; very hard, very firm, very sticky and very plastic; common fine roots; many fine tubular pores; common thin clay films on vertical faces of peds; common fine and medium soft masses of lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

B3ca—11 to 20 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure parting to moderate coarse angular blocky; hard, firm, very sticky and plastic; common fine roots; many fine tubular pores; common soft medium masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

C1cs—20 to 54 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, very sticky and plastic; few fine roots; common fine gypsum crystals; strongly effervescent; strongly alkaline; gradual wavy boundary.

C2cssa—54 to 60 inches; pale olive (5Y 6/3) clay loam, olive (5Y 5/3) moist; massive; hard, friable, very sticky and plastic; few fine roots; many fine gypsum crystals; many soft medium masses of salt crystals; moderately alkaline.

The B2t horizon is dominantly clay, but in some pedons it is clay loam or silty clay. It is moderately alkaline or strongly alkaline. The C horizon commonly is clay loam or clay, but some pedons have thin strata of fine sandy loam.

Glendive Series

The Glendive series consists of deep, well drained, moderately rapidly permeable soils that formed in alluvium. These soils are on fans, terraces, and flood plains in valleys. Slope is 0 to 2 percent.

These soils are coarse-loamy, mixed (calcareous), frigid Ustic Torrifluvents.

Typical pedon of Glendive loam, 0 to 2 percent slopes, in rangeland, 50 feet south and 1,900 feet east of the northwest corner of sec. 35, T. 21 N., R. 43 E.

A1—0 to 6 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1—6 to 60 inches; grayish brown (10YR 5/2) stratified fine sandy loam and loamy fine sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; moderately alkaline.

The A horizon is sandy loam, loam, or silty clay loam and is mildly alkaline or moderately alkaline. The horizon is 4 to 7 inches thick. It is less than 5 percent finely divided lime. The C horizon is mildly alkaline to strongly alkaline.

Hanly Series

The Hanly series consists of deep, somewhat excessively drained, rapidly permeable soils that formed in recent, stratified, sandy alluvium. These soils are on stream terraces and flood plains. Slope is 0 to 2 percent.

These soils are sandy, mixed, frigid Ustic Torrifluvents.

Typical pedon of Hanly loamy fine sand in rangeland, 3,310 feet west and 780 feet north of the southeast corner of sec. 26, T. 27 N., R. 41 E.

A1—0 to 4 inches; grayish brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose; many fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—4 to 60 inches; light brownish gray (10YR 6/2) loamy fine sand with a few 1-inch thick strata of loam, dark grayish brown (10YR 4/2) moist; single grain; loose; few fine roots; slightly effervescent; moderately alkaline.

The 10- to 40-inch control section averages loamy sand or loamy fine sand. The profile is neutral to moderately alkaline.

Harlem Series

The Harlem series consists of deep, well drained, slowly permeable soils that formed in alluvium. These soils are on terraces and flood plains in valleys. Slope is 0 to 2 percent.

These soils are fine, montmorillonitic (calcareous), frigid Ustic Torrifluvents.

Typical pedon of Harlem silty clay, protected, in cropland, 15 feet west and 2,640 feet south of the northeast corner of sec. 10, T. 26 N., R. 43 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—5 to 23 inches; light brownish gray (2.5Y 6/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate fine subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine roots; slightly effervescent; moderately alkaline; gradual wavy boundary.

C2—23 to 60 inches; grayish brown (2.5Y 5/2) silty clay with thin strata of silt loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; slightly effervescent; moderately alkaline.

The profile is mildly alkaline or moderately alkaline. The A horizon is less than 5 percent finely divided lime. The C horizon is clay or silty clay and has thin strata of silty clay loam, silt loam, or loam.

Havre Series

The Havre series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on terraces and flood plains in valleys. Slope is 0 to 2 percent.

These soils are fine-loamy, mixed (calcareous), frigid Ustic Torrifluvents.

Typical pedon of Havre silt loam in rangeland, 1,180 feet east and 200 feet north of the southwest corner of sec. 31, T. 17 N., R. 45 E.

A1—0 to 5 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium platy structure; hard, friable, slightly sticky and slightly plastic; many fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—5 to 60 inches; light brownish gray (2.5Y 6/2) silt loam and thin strata of fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent; moderately alkaline.

The profile is mildly alkaline or moderately alkaline. The A horizon is silt loam or silty clay loam. It is less than 5 percent finely divided lime. The C horizon is loam or silt loam. In some pedons it has thin strata of loamy sand, coarse sand, fine sandy loam, or silty clay loam.

Havrelon Series

The Havrelon series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on stream terraces and flood plains in valleys. Slope is 0 to 2 percent.

These soils are fine-loamy, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of Havrelon loam in rangeland, 1,680 feet south and 600 feet east of the northwest corner of sec. 12, T. 20 N., R. 49 E.

A1—0 to 5 inches; pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; slightly effervescent; mildly alkaline; clear wavy boundary.

C1—5 to 60 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; mildly alkaline.

The A horizon is loam or silty clay loam. It is less than 5 percent finely divided lime. The C horizon is mainly very fine sandy loam or loam.

Hillon Series

The Hillon series consists of deep, well drained, slowly permeable soils that formed in glacial till. These soils are on glaciated uplands. Slope is 2 to 45 percent.

These soils are fine-loamy, mixed (calcareous), frigid Ustic Torriorthents.

Typical pedon of a Hillon loam in an area of Telstad-Hillon loams, 2 to 8 percent slopes, in rangeland, 40 feet west and 2,500 feet north of the southeast corner of sec. 17, T. 25 N., R. 44 E.

A11—0 to 5 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; slightly effervescent; mildly alkaline; clear wavy boundary.

A12—5 to 7 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; 5 percent pebbles; few soft fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—7 to 27 inches; light gray (5Y 7/2) loam, olive (5Y 5/3) moist; massive; hard, friable, sticky and slightly plastic; many fine roots; common fine tubular pores; 5 percent pebbles; many soft coarse masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—27 to 38 inches; light gray (5Y 7/2) loam, olive (5Y 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine roots; 5 percent pebbles; common soft medium masses of lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

C3ca—38 to 60 inches; pale yellow (5Y 7/3) loam, olive (5Y 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; 5 percent pebbles; few soft fine and medium masses of lime; strongly effervescent; strongly alkaline.

The A horizon is mildly alkaline or moderately alkaline. The C horizon is moderately alkaline or strongly alkaline.

Hoffmanville Series

The Hoffmanville series consists of deep, well drained, slowly permeable soils that formed in alluvium. These soils are on terraces of the Missouri River. Slope is 0 to 2 percent.

These soils are clayey over sandy or sandy-skeletal, montmorillonitic (calcareous), frigid Typic Ustifluvents.

Typical pedon of Hoffmanville silty clay, protected, in cropland, 2,450 feet south and 100 feet east of the northwest corner of sec. 26, T. 27 N., R. 47 E.

Ap—0 to 5 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak fine and medium subangular blocky structure; hard, friable, very sticky and very plastic; few very fine roots; mildly alkaline; slightly effervescent; abrupt smooth boundary.

C1—5 to 12 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, very sticky and very plastic; many very fine roots; common very fine tubular pores; mildly alkaline; slightly effervescent; clear wavy boundary.

C2—12 to 28 inches; grayish brown (2.5Y 5/2) silty clay and thin strata of silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, very sticky and very plastic; common very fine roots; many very fine tubular pores; mildly alkaline; slightly effervescent; clear smooth boundary.

IIC3—28 to 60 inches; light brownish gray (2.5Y 6/2) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; few very fine roots; mildly alkaline; slightly effervescent.

The C horizon is clay or silty clay. Depth to the sandy IIC horizon is 20 to 30 inches.

Kirby Series

The Kirby series consists of deep, well drained, rapidly permeable soils that formed in sandstone and shale. These soils are on upper side slopes and ridges of hills on uplands. Slope is 8 to 45 percent.

These soils are fragmental, mixed (calcareous), frigid Ustic Torriorthents.

Typical pedon of a Kirby very channery loam in an area of Cabbart-Kirby complex, 8 to 45 percent slopes, in rangeland, 1,576 feet east and 865 feet north of the southwest corner of sec. 6, T. 21 N., R. 46 E.

A1—0 to 5 inches; light brown (7.5YR 6/4) very channery loam, brown (7.5YR 4/4) moist; moderate very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; 40 percent coarse fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—5 to 14 inches; light brown (7.5YR 6/4) very channery loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; 45 percent coarse fragments; violently effervescent; moderately alkaline; clear smooth boundary.

C2ca—14 to 18 inches; light brown (7.5YR 6/4) extremely channery loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine roots in cracks; 75 percent coarse fragments; common distinct lime coatings on lower surfaces of fragments; violently effervescent; moderately alkaline; clear smooth boundary.

C3ca—18 to 60 inches; light brown (7.5YR 6/4) baked sandstone and shale fragments; few fine roots in cracks; common distinct lime coatings on undersides of coarse fragments in upper 10 inches; strongly effervescent.

Depth to fragmental material is 10 to 20 inches.

Kremlin Series

The Kremlin series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on fans and terraces of uplands. Slope is 0 to 8 percent.

These soils are fine-loamy, mixed Aridic Haploborolls.

Typical pedon of Kremlin loam, 0 to 4 percent slopes, in rangeland, 1,375 feet west and 1,180 feet south of the northeast corner of sec. 15, T. 18 N., R. 45 E.

A11—0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; mildly alkaline; clear wavy boundary.

A12—2 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate fine and medium angular blocky; slightly hard, friable, nonsticky and nonplastic; common fine and medium roots; many fine tubular pores; neutral; gradual wavy boundary.

B2—6 to 10 inches; dark grayish brown (2.5Y 4/2) loam, very dark grayish brown (2.5Y 3/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, nonsticky and nonplastic; common fine and medium

roots; common fine tubular pores; mildly alkaline; clear wavy boundary.

B3ca—10 to 13 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; moderate coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—13 to 18 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak very coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; common lime coatings in pores; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—18 to 60 inches; light gray (10YR 7/2) loam with thin strata of fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; violently effervescent; moderately alkaline.

The mollic epipedon is 10 to 12 inches thick.

Lehr Series

The Lehr series consists of deep, somewhat excessively drained soils that formed in alluvium. Permeability is moderately rapid in the upper part of these soils and very rapid in the lower part. These soils are on stream terraces and outwash plains. Slope is 2 to 8 percent.

These soils are fine-loamy over sandy or sandy-skeletal, mixed Typic Haploborolls.

Typical pedon of Lehr loam, 2 to 8 percent slopes, in rangeland, 2,200 feet east and 1,495 feet north of the southwest corner of sec. 13, T. 17 N., R. 48 E.

A1—0 to 4 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; 5 percent pebbles; neutral; clear wavy boundary.

B2—4 to 8 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; 5 percent pebbles; neutral; clear wavy boundary.

B3ca—8 to 18 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium and coarse prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; 5 percent pebbles; common distinct lime coatings on lower surfaces of fragments; common threadlike masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

IIC1ca—18 to 60 inches; very pale brown (10YR 7/3) very gravelly fine sand, pale brown (10YR 6/3) moist; single grain; loose; few fine roots; 60 percent pebbles; many lime coatings on lower surfaces of fragments; violently effervescent; moderately alkaline.

The mollic epipedon is 7 to 14 inches thick. Depth to carbonates is 7 to 14 inches. Depth to very gravelly or extremely gravelly material is 14 to 20 inches. The B2 horizon is mildly alkaline or moderately alkaline. The IIC horizon is very gravelly or extremely gravelly loamy sand, loamy fine sand, or fine sand. It has thin strata of sand or coarse sandy loam.

Lisk Series

The Lisk series consists of deep, somewhat excessively drained, moderately rapidly permeable soils that formed in eolian material and alluvium derived from soft sandstone. These soils are in swales and depressional areas on foot slopes and side slopes of hills. Slope is 2 to 15 percent.

These soils are coarse-loamy, mixed, frigid Typic Ustochrepts.

Typical pedon of Lisk sandy loam, 2 to 8 percent slopes, in rangeland, 1,580 feet east and 50 feet south of the northwest corner of sec. 13, T. 20 N., R. 46 E.

A1—0 to 5 inches; grayish brown (2.5Y 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

B2—5 to 15 inches; light brownish gray (2.5Y 6/2) sandy loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure; soft, very friable, nonsticky and nonplastic; common fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C1ca—15 to 30 inches; pale olive (5Y 6/3) sandy loam, olive (5Y 4/4) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; common fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C2ca—30 to 41 inches; pale olive (5Y 6/3) sandy loam, olive (5Y 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; moderately alkaline; gradual irregular boundary.

C3—41 to 60 inches; light gray (5Y 7/2) loamy sand, light olive gray (5Y 6/2) moist; single grain; loose; few fine roots; slightly effervescent; moderately alkaline.

The 10- to 40-inch control section is sandy loam or fine sandy loam.

Lohler Series

The Lohler series consists of deep, moderately well drained, moderately slowly permeable soils that formed in alluvium. These soils are on terraces and flood plains in valleys. Slope is 0 to 2 percent.

These soils are fine, montmorillonitic (calcareous), frigid Typic Ustifluvents.

Typical pedon of Lohler silty clay loam, protected, in cropland, 50 feet west and 900 feet north of the southeast corner of sec. 33, T. 27 N., R. 47 E.

A1p—0 to 4 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, sticky and plastic; many fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

A12—4 to 6 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—6 to 35 inches; grayish brown (2.5Y 5/2) stratified silty clay and silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, very sticky and very plastic; many fine roots; many very fine tubular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C2—35 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few fine roots; many very fine tubular pores; strongly effervescent; moderately alkaline.

The 10- to 40-inch control section is silty clay loam, clay, or silty clay. The profile is mildly alkaline or moderately alkaline. The A horizon is less than 5 percent finely divided lime. It is silty clay loam or silty clay.

Lonna Series

The Lonna series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on terraces and fans of uplands. Slope is 0 to 8 percent.

These soils are fine-silty, mixed Borollic Camborthids.

Typical pedon of Lonna silty clay loam, 0 to 4 percent slopes, in rangeland, 300 feet west and 1,800 feet north of the southeast corner of sec. 19, T. 17 N., R. 44 E.

A1—0 to 3 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium angular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

B2—3 to 12 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, sticky and slightly plastic; many fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

B3ca—12 to 16 inches; very pale brown (10YR 7/4) silty clay loam, light yellowish brown (10YR 6/4) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common soft threadlike masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

C1ca—16 to 26 inches; very pale brown (10YR 7/4) silt loam, light yellowish brown (10YR 6/4) moist; massive; hard, friable, sticky and plastic; common fine roots; many fine tubular pores; common soft threadlike masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

C2—26 to 49 inches; very pale brown (10YR 7/4) silt loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, sticky and plastic; common fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—49 to 60 inches; very pale brown (10YR 7/4) silt loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, sticky and plastic; few fine roots; many fine tubular pores; strongly effervescent; moderately alkaline.

The solum is 12 to 16 inches thick. The B3ca and C horizons are dominantly silt loam or silty clay loam, but in some pedons the C horizon has thin strata of very fine sandy loam.

Macar Series

The Macar series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on fans, terraces, foot slopes, and lower side slopes of hills on uplands. Slope is 0 to 20 percent.

These soils are fine-loamy, mixed, frigid Typic Ustochrepts.

Typical pedon of Macar loam, 0 to 4 percent slopes, in rangeland, 1,970 feet west and 2,365 feet north of the southeast corner of sec. 27, T. 20 N., R. 49 E.

A1—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; mildly alkaline; clear smooth boundary.

B2—3 to 10 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; slightly hard, very friable, nonsticky and

nonplastic; many fine roots; few fine tubular pores; slightly effervescent; mildly alkaline; clear wavy boundary.

B3ca—10 to 16 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium and coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; common fine tubular pores; 5 percent pebbles; common distinct lime coatings on lower surfaces of pebbles; violently effervescent; moderately alkaline; gradual wavy boundary.

C1ca—16 to 26 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; 5 percent pebbles; common distinct lime coatings on lower surfaces of pebbles; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—26 to 34 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; common threadlike masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C3ca—34 to 43 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; common fine tubular pores; 5 percent pebbles; few faint lime coatings on lower surfaces of pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

C4—43 to 60 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; 5 percent pebbles; strongly effervescent; mildly alkaline.

The solum is 12 to 16 inches thick.

Marias Series

The Marias series consists of deep, well drained, very slowly permeable soils that formed in alluvium. These soils are on fans and terraces of uplands. Slope is 0 to 2 percent.

These soils are fine, montmorillonitic, frigid Udorthentic Chromusterts.

Typical pedon of Marias clay in rangeland, 970 feet west and 700 feet north of the southeast corner of sec. 18, T. 26 N., R. 43 E.

A11—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure parting to strong very fine and fine granular; slightly hard, friable, sticky and plastic; many fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

A12—3 to 12 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, firm, very sticky and very plastic; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—12 to 33 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, very sticky and very plastic; many fine roots between peds; common distinct shiny slickensides; few threadlike masses of lime; slightly effervescent; moderately alkaline; clear wavy boundary.

C2cs—33 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, very sticky and very plastic; few fine roots; few distinct shiny slickensides; common fine gypsum crystals; few threadlike masses of lime; slightly effervescent; moderately alkaline.

The profile is mildly alkaline or moderately alkaline. The 10- to 40-inch control section is clay or silty clay. In some pedons strata of silty clay loam or silt loam are in the lower part of the C horizon.

Marvan Series

The Marvan series consists of deep, well drained, salt- and sodium-affected, very slowly permeable soils that formed in alluvium. These soils are on fans and terraces and on foot slopes of low hills on uplands. Slope is 0 to 8 percent.

These soils are fine, montmorillonitic, frigid Udorthentic Chromusterts.

Typical pedon of Marvan clay, 0 to 8 percent slopes, 1,280 feet west and 2,400 feet south of the northeast corner of sec. 7, T. 26 N., R. 47 E.

Ap—0 to 4 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate very fine and fine granular structure; very hard, friable, very sticky and very plastic; many fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—4 to 27 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, very sticky and very plastic; common fine roots; common fine tubular pores; few distinct shiny slickensides; strongly effervescent; strongly alkaline; gradual wavy boundary.

C2cs—27 to 35 inches; olive (5Y 5/3) clay, olive (5Y 4/3) moist; massive; very hard, firm, very sticky and very plastic; few fine roots; common fine tubular pores; few faint shiny slickensides; common soft fine and medium gypsum crystals; strongly effervescent; strongly alkaline; clear smooth boundary.

IIC3—35 to 60 inches; light yellowish brown (2.5Y 6/4) silty clay loam stratified with thin bands of silt loam and fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent; strongly alkaline.

Cracks extend from the surface to a depth of 20 inches. The C horizon is clay, silty clay, or silty clay loam. It generally is moderately alkaline or strongly alkaline, but in some pedons it is very strongly alkaline in the lower part.

Neldore Series

The Neldore series consists of shallow, well drained, slowly permeable soils that formed in material derived from consolidated shale. These soils are on the sides and tops of hills and ridges on uplands. Slope is 2 to 45 percent.

These soils are clayey, montmorillonitic, nonacid, frigid, shallow Ustic Torriorthents.

Typical pedon of a Neldore clay in an area of Neldore-Badland-Bascovy complex, 15 to 45 percent slopes, in rangeland, 550 feet north and 1,600 feet east of the southwest corner of sec. 1, T. 26 N., R. 41 E.

A1—0 to 5 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong very fine and fine granular structure; hard, firm, sticky and plastic; many fine roots; neutral; clear wavy boundary.

C1—5 to 17 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; common fine roots; 70 percent soft shale fragments; slightly acid; gradual irregular boundary.

C2rcs—17 to 60 inches; olive gray (5Y 4/2) consolidated shale, dark olive gray (5Y 3/2) moist; common fine and medium gypsum crystals; slightly acid.

Consolidated shale is at a depth of 10 to 20 inches. The control section is clay or silty clay. The A horizon is 3 to 5 inches thick. In some pedons the C horizon is 70 percent soft shale fragments. It is medium acid to neutral. The Cr horizon is slightly acid to strongly acid.

Pendroy Series

The Pendroy series consists of deep, well drained, very slowly permeable soils that formed in clayey alluvium. These soils are in oxbows and depressional areas on terraces of the Missouri River. Slope is 0 to 2 percent.

These soils are very-fine, montmorillonitic, frigid Udorthentic Chromusterts.

Typical pedon of Pendroy clay in rangeland, 550 feet south and 10 feet east of the northwest corner of sec. 22, T. 26 N., R. 44 E.

A11—0 to 1 inch; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and plastic; many fine roots; many fine vesicular pores, common fine tubular pores; neutral; abrupt smooth boundary.

A12—1 inch to 14 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong very fine and fine angular blocky structure; very hard, very firm, very sticky and very plastic; many fine roots; common fine tubular pores; slightly effervescent; mildly alkaline; clear wavy boundary.

C1cs—14 to 24 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; strong very fine and fine angular blocky structure; very hard, firm, very sticky and very plastic; many fine roots; common fine tubular pores; common threadlike gypsum crystals; slightly effervescent; mildly alkaline; clear wavy boundary.

C2csca—24 to 47 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; massive; hard, firm, very sticky and very plastic; common fine roots; common distinct shiny slickensides; common threadlike gypsum crystals; common threadlike masses of lime; slightly effervescent; moderately alkaline; clear wavy boundary.

C3csca—47 to 60 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; few fine roots; common fine tubular pores; few shiny slickensides; common threadlike gypsum crystals; few firm threadlike masses of lime; strongly effervescent; moderately alkaline.

The 10- to 40-inch control section is 60 to 75 percent clay. Cracks extend from the surface to a depth of 15 to 25 inches. The profile is neutral or moderately alkaline.

Ridgelawn Series

The Ridgelawn series consists of deep, well drained soils that formed in alluvium. Permeability is moderate in the upper part of these soils and rapid in the lower part. These soils are on stream terraces and flood plains in valleys. Slope is 0 to 2 percent.

These soils are fine-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of Ridgelawn silt loam in rangeland, 2,640 feet south and 2,360 feet east of the northwest corner of sec. 35, T. 21 N., R. 49 E.

A1—0 to 7 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; weak medium angular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; many fine

tubular pores; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—7 to 24 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, slightly sticky and nonplastic; many fine roots; many fine tubular pores; strongly effervescent; moderately alkaline; clear wavy boundary.

IIC2—24 to 60 inches; grayish brown (2.5Y 5/2) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; few fine roots; slightly effervescent; moderately alkaline.

Depth to the sandy IIC horizon is 20 to 30 inches.

Rominell Series

The Rominell series consists of deep, well drained, slowly permeable, salt- and sodium-affected soils that formed in alluvium derived from sandstone and shale. These soils are on fans and terraces of uplands. Slope is 0 to 8 percent.

These soils are fine-loamy, mixed Borollic Natrargids.

Typical pedon of Rominell loam, 0 to 8 percent slopes, in rangeland, 1,650 feet east and 1,650 feet south of the northwest corner of sec. 19, T. 24 N., R. 48 E.

A1—0 to 4 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many fine roots; common fine tubular pores; mildly alkaline; clear smooth boundary.

A2—4 to 9 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; slightly effervescent; moderately alkaline; abrupt wavy boundary.

B2t—9 to 15 inches; light brownish gray (2.5Y 6/2) clay loam, olive brown (2.5Y 4/4) moist; strong medium columnar structure parting to strong medium angular blocky; very hard, firm, sticky and plastic; many fine roots; many fine tubular pores; common thin clay films on faces of peds; many distinct light gray (2.5Y 7/2) skeletans on tops and sides of columns; strongly effervescent; very strongly alkaline; clear wavy boundary.

B3cs—15 to 25 inches; light olive brown (2.5Y 5/4) loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; few light gray (2.5Y 7/2) skeletans on vertical faces of peds; few fine gypsum crystals; violently effervescent; very strongly alkaline; gradual wavy boundary.

C1cs—25 to 54 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; massive; hard, friable, sticky and slightly plastic; common fine roots; common fine tubular pores; few fine gypsum crystals; violently effervescent; strongly alkaline; gradual wavy boundary.

C2—54 to 60 inches; light olive brown (2.5Y 5/4) loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, sticky and slightly plastic; few fine roots; common fine tubular pores; violently effervescent; very strongly alkaline.

The A1 horizon is neutral or moderately alkaline, and the A2 horizon is mildly alkaline to moderately alkaline. The B2t horizon is strongly alkaline or very strongly alkaline. The B3 and C horizons are mainly clay loam or loam and are strongly alkaline or very strongly alkaline.

Savage Series

The Savage series consists of deep, well drained, moderately slowly permeable soils that formed in alluvium. These soils are on terraces and fans of uplands. Slope is 0 to 4 percent.

These soils are fine, montmorillonitic Typic Argiborolls.

Typical pedon of Savage silty clay loam, 0 to 4 percent slopes, in cropland, 100 feet west and 300 feet south of the northeast corner of sec. 11, T. 22 N., R. 47 E.

Ap1—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to strong very fine granular; soft, very friable, sticky and plastic; many fine roots; neutral; abrupt smooth boundary.

Ap2—3 to 7 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark brown (10YR 2/2) moist; massive; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; neutral; abrupt smooth boundary.

B21t—7 to 16 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, very sticky and plastic; many fine roots; many fine tubular pores; common thin clay films on faces of peds; neutral; clear wavy boundary.

B22t—16 to 28 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to strong fine and medium angular blocky; slightly hard, friable, very sticky and plastic; many fine roots; many fine tubular pores; many thin clay films on faces of peds; strongly effervescent; moderately alkaline; gradual wavy boundary.

B3ca—28 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to

moderate fine and medium subangular blocky; hard, friable, very sticky and plastic; many fine roots; many fine tubular pores; common soft threadlike masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C1ca—36 to 43 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; hard, friable, very sticky and plastic; common fine roots; many fine tubular pores; common distinct light gray threadlike masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2cacs—43 to 55 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, very sticky and plastic; common fine roots; many fine tubular pores; common distinct light gray threadlike masses of lime; few threadlike masses of gypsum crystals; violently effervescent; moderately alkaline; gradual wavy boundary.

C3cacs—55 to 60 inches; pale olive (5Y 6/3) clay loam, olive (5Y 4/3) moist; massive; slightly hard, friable, sticky and plastic; few fine roots; common fine tubular pores; 5 percent pebbles; common soft threadlike masses of lime; few threadlike masses of gypsum crystals; violently effervescent; moderately alkaline.

The B2t horizon averages heavy silty clay loam or light silty clay. The B3ca and C horizons are silty clay loam, silty clay, or clay loam.

Shambo Series

The Shambo series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on fans, terraces, foot slopes, and side slopes on uplands. Slope is 0 to 15 percent.

These soils are fine-loamy, mixed Typic Haploborolls.

Typical pedon of a Shambo loam in an area of Shambo-Cambert loams, 2 to 8 percent slopes, in rangeland, 85 feet west and 94 feet north of the southeast corner of sec. 35, T. 19 N., R. 45 E.

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine roots; many fine tubular pores; neutral; abrupt smooth boundary.

B21—4 to 7 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure; slightly hard, friable, slightly sticky and nonplastic; many fine roots; many fine tubular pores; neutral; clear wavy boundary.

B22—7 to 14 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate medium and coarse prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, slightly sticky and nonplastic; many fine roots; common fine tubular pores; mildly alkaline; clear wavy boundary.

B3ca—14 to 22 inches; pale yellow (2.5Y 7/4) loam, light yellowish brown (2.5Y 6/4) moist; moderate coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; many threadlike masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C1cs—22 to 60 inches; light gray (2.5Y 7/2) loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; many fine and medium gypsum crystals; strongly effervescent; moderately alkaline.

The mollic epipedon is 7 to 14 inches thick. The B horizon is neutral to moderately alkaline in the upper part and moderately alkaline to strongly alkaline in the lower part. The C horizon commonly is loam or clay loam, but in some pedons it has strata of sandy loam. It is mildly alkaline to strongly alkaline.

Sunburst Series

The Sunburst series consists of deep, well drained, slowly permeable soils that formed in glacial till. These soils are on knolls, foot slopes, side slopes, and ridges of hills on glaciated uplands. Slope is 2 to 45 percent.

These soils are fine, montmorillonitic (calcareous), frigid Ustic Torriorthents.

Typical pedon of Sunburst clay loam, 15 to 45 percent slopes, in rangeland, 2,205 feet north and 235 feet west of the southeast corner of sec. 36, T. 26 N., R. 42 E.

A1—0 to 3 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure parting to moderate fine granular; soft, very friable, sticky and plastic; many fine roots; 5 percent pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—3 to 19 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; slightly hard, friable, sticky and very plastic; many fine roots; many fine tubular pores; 5 percent pebbles; common soft medium and coarse masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—19 to 50 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium angular blocky structure; hard, firm, sticky and very plastic; few fine roots; common fine tubular pores; 5 percent pebbles; few soft threadlike masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C3cs—50 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong medium angular blocky structure; hard, firm, very sticky and very plastic; few fine roots; common fine tubular pores; 5 percent pebbles; few medium and coarse masses of gypsum crystals; strongly effervescent; moderately alkaline.

The C horizon commonly is clay or silty clay, but in some pedons it is silty clay loam.

Tally Series

The Tally series consists of deep, well drained, moderately rapidly permeable soils that formed in alluvial or eolian material. These soils are on fans and terraces and on foot slopes and side slopes of hills on uplands. Slope is 0 to 8 percent.

These soils are coarse-loamy, mixed Typic Haploborolls.

Typical pedon of Tally fine sandy loam, 0 to 4 percent slopes, in rangeland, 1,400 feet north and 20 feet west of the southeast corner of sec. 12, T. 16 N., R. 46 E.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine roots; neutral; abrupt smooth boundary.

B21—4 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine and medium angular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; neutral; clear wavy boundary.

B22—10 to 15 inches; grayish brown (2.5Y 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; slightly hard, friable, slightly sticky and nonplastic; many fine roots; many fine tubular pores; neutral; clear wavy boundary.

B3ca—15 to 20 inches; light brownish gray (10YR 6/2) sandy loam, brown (10YR 5/3) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; few soft fine masses of lime; strongly effervescent; mildly alkaline; clear wavy boundary.

C1ca—20 to 31 inches; light gray (10YR 7/2) fine sandy loam, pale brown (10YR 6/3) moist; massive; hard, friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; many fine firm masses of lime; violently effervescent; mildly alkaline; clear wavy boundary.

C2ca—31 to 60 inches; light brownish gray (2.5Y 6/2) loamy fine sand, grayish brown (2.5Y 5/2) moist; single grain; loose; few fine roots; common lime coatings on sand; violently effervescent; moderately alkaline.

The mollic epipedon is 8 to 10 inches thick. The B2 and B3 horizons are fine sandy loam or sandy loam. The C horizon commonly is fine sandy loam or loamy fine sand, but in some pedons it has strata of loamy sand.

Telstad Series

The Telstad series consists of deep, well drained, slowly permeable soils that formed in glacial till. These soils are on glaciated uplands. Slope is 2 to 15 percent.

These soils are fine-loamy, mixed Aridic Argiborolls.

Typical pedon of a Telstad loam in an area of Telstad-Hillon loams, 2 to 8 percent slopes, in rangeland, 1,340 feet west and 1,810 feet north of the southeast corner of sec. 15, T. 25 N., R. 44 E.

A1—0 to 4 inches; dark grayish brown (2.5Y 4/2) loam, very dark grayish brown (2.5Y 3/2) moist; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; neutral; clear smooth boundary.

B21t—4 to 7 inches; dark grayish brown (2.5Y 4/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; strong fine and medium prismatic structure parting to strong medium subangular blocky; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common thin dark brown (10YR 3/3) clay films on horizontal and vertical faces of peds; neutral; clear wavy boundary.

B22t—7 to 13 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; strong medium and coarse prismatic structure parting to moderate medium and coarse subangular blocky; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common thin clay films on horizontal and vertical faces of peds; neutral; clear wavy boundary.

B3ca—13 to 22 inches; light gray (2.5Y 7/2) loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; slightly hard, friable, sticky and slightly plastic; common fine roots; many fine tubular pores; many medium and coarse masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

C1ca—22 to 60 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, sticky and slightly plastic; few fine roots; few fine and medium masses of lime; strongly effervescent; moderately alkaline.

The mollic epipedon is 7 to 15 inches thick. The A and B horizons are neutral or moderately alkaline. The B and C horizons are loam or clay loam.

Thoeny Series

The Thoeny series consists of deep, well drained, salt- and sodium-affected, very slowly permeable soils that formed in glacial till. These soils are in swales and on fans and foot slopes of low hills on glaciated uplands. Slope is 2 to 8 percent.

These soils are fine, montmorillonitic Borollic Natrargids.

Typical pedon of Thoeny loam, 2 to 8 percent slopes, in cropland, 1,400 feet north and 600 feet east of the southwest corner of sec. 12, T. 26 N., R. 49 E.

Ap1—0 to 6 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure parting to moderate very fine granular; slightly hard, very friable, sticky and slightly plastic; many fine roots; 5 percent pebbles; strongly effervescent; moderately alkaline; abrupt smooth boundary.

B21tca—6 to 12 inches; olive (5Y 5/3) clay loam, olive (5Y 4/3) moist; strong medium prismatic structure parting to strong medium subangular blocky; slightly hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common thin clay films on horizontal and vertical faces of peds; 5 percent pebbles; common distinct white lime coatings on lower surfaces of pebbles; violently effervescent; strongly alkaline; clear wavy boundary.

B22tca—12 to 22 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine prismatic structure parting to strong very fine angular blocky; hard, firm, very sticky and plastic; many fine roots; many fine tubular pores; many thin clay films on horizontal and vertical faces of peds; 5 percent pebbles; many distinct white lime coatings on lower surfaces of pebbles; violently effervescent; very strongly alkaline; clear wavy boundary.

B3tca—22 to 31 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, very sticky and plastic; common fine roots; many fine tubular pores; common thin clay films on horizontal and vertical faces of peds; 5 percent pebbles; many distinct lime coatings on lower surfaces of pebbles; violently effervescent; strongly alkaline; gradual wavy boundary.

C1cs—31 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, very sticky and plastic; few fine roots; common fine tubular pores; 5 percent pebbles; common fine and medium masses of gypsum crystals; strongly effervescent; strongly alkaline.

The control section is heavy clay loam or light clay. It is mildly alkaline or moderately alkaline.

These soils are taxadjuncts to the Thoeny series because they have a ca horizon within a depth of 10 inches and are very strongly alkaline in the B22tca horizon. These properties are outside the range of characteristics for the Thoeny series; they do not, however, significantly affect the use or behavior of these soils.

Trembles Series

The Trembles series consists of deep, well drained, moderately rapidly permeable soils that formed in alluvium. These soils are on stream terraces and flood plains. Slope is 0 to 2 percent.

These soils are coarse-loamy, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of Trembles fine sandy loam in rangeland, 2,330 feet south and 787 feet east of the northwest corner of sec. 21, T. 19 N., R. 48 E.

A1—0 to 6 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—6 to 16 inches; yellowish brown (10YR 5/4) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; slightly effervescent; moderately alkaline; gradual wavy boundary.

C2—16 to 60 inches; light brownish gray (2.5Y 6/2) fine sandy loam that has thin strata of loam and silt loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; moderately alkaline.

The C horizon is stratified silty clay loam to loamy sand. It is dominantly sandy loam or fine sandy loam.

Turner Series

The Turner series consists of deep, well drained soils that formed in alluvium. Permeability is moderate in the upper part of these soils and rapid in the lower part. These soils are on fans, terraces, and foot slopes of low hills on uplands. Slope is 0 to 8 percent.

These soils are fine-loamy over sandy or sandy-skeletal, mixed Typic Argiborolls.

Typical pedon of Turner loam, 0 to 4 percent slopes, in cropland, 1,494 feet north and 1,340 feet east of the southwest corner of sec. 1, T. 23 N., R. 47 E.

Ap1—0 to 7 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard,

friable, slightly sticky and plastic; many fine roots; many fine tubular pores; 5 percent pebbles; mildly alkaline; abrupt smooth boundary.

B2t—7 to 14 inches; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; common thin very dark grayish brown (10YR 3/2) clay films on horizontal faces of peds; 5 percent pebbles; mildly alkaline; clear wavy boundary.

B31ca—14 to 20 inches; grayish brown (10YR 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, sticky and plastic; common fine roots; many fine tubular pores; few faint light gray calcium carbonate cutans throughout the soil; 5 percent pebbles; violently effervescent; moderately alkaline; clear wavy boundary.

B32ca—20 to 28 inches; light brownish gray (2.5Y 6/2) loam, light olive brown (2.5Y 5/4) moist; weak fine and medium subangular blocky structure; hard, firm, sticky and plastic; common fine roots; many fine tubular pores; common distinct light gray (10YR 7/2) calcium carbonate cutans throughout; common distinct lime coatings on sand grains and pebbles; 5 percent pebbles; violently effervescent; moderately alkaline; clear wavy boundary.

C1ca—28 to 33 inches; light brownish gray (2.5Y 6/2) gravelly loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, nonsticky and nonplastic; few fine roots; common fine tubular pores; many distinct lime coatings on sand grains and pebbles; 20 percent pebbles; violently effervescent; moderately alkaline; gradual wavy boundary.

IIC2ca—33 to 60 inches; light olive brown (2.5Y 5/4) very gravelly loamy sand, olive brown (2.5Y 4/4) moist; single grain; loose; 60 percent pebbles; violently effervescent; moderately alkaline.

The mollic epipedon is 7 to 14 inches thick. Depth to the IIC horizon is 30 to 40 inches. The B2t horizon is neutral to moderately alkaline.

Twilight Series

The Twilight series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in material derived from weakly consolidated, sandy sedimentary beds. These soils are on the sides and tops of hills on uplands. Slope is 2 to 25 percent.

These soils are coarse-loamy, mixed Borollic Camborthids.

Typical pedon of Twilight sandy loam in an area of Busby-Twilight-Fleak complex, 8 to 15 percent slopes, in rangeland, 2,400 feet north and 800 feet east of the southwest corner of sec. 34, T. 26 N., R. 44 E.

A1—0 to 5 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; neutral; clear wavy boundary.

B2—5 to 10 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; neutral; clear wavy boundary.

B3—10 to 16 inches; pale brown (10YR 6/3) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; many very fine roots; neutral; gradual wavy boundary.

C1ca—16 to 25 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; few threadlike masses of lime; slightly effervescent; neutral; gradual wavy boundary.

C2r—25 to 60 inches; light brownish gray (2.5Y 6/2) weakly consolidated sandy sedimentary beds that crush to loamy sand, dark grayish brown (2.5Y 4/2) moist; slightly hard, friable, nonsticky and nonplastic; few very fine roots in cracks and along bedding planes; neutral.

Depth to sedimentary beds is 20 to 40 inches.

Vanda Series

The Vanda series consists of deep, well drained, salt- and sodium-affected, very slowly permeable soils that formed in alluvium. These soils are on fans and terraces. Slope is 0 to 8 percent.

These soils are fine, montmorillonitic (calcareous), frigid Ustic Torriorthents.

Typical pedon of Vanda clay, 0 to 8 percent slopes, in rangeland, 2,600 feet east and 150 feet south of the northwest corner of sec. 9, T. 26 N., R. 47 E.

A1—0 to 2 inches; light gray (5Y 6/1) clay, dark gray (5Y 4/1) moist; strong fine and medium subangular blocky structure; very hard, firm, very sticky and very plastic; common fine roots; many fine vesicular pores; strongly alkaline; clear smooth boundary.

C1—2 to 11 inches; light olive gray (5Y 6/2) clay, olive gray (5Y 5/2) moist; strong very fine and fine angular blocky structure; very hard, very firm, very sticky and very plastic; common fine roots; common fine tubular pores; common soft medium masses of lime; strongly effervescent; strongly alkaline; gradual wavy boundary.

C2cs—11 to 26 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine angular blocky structure; very hard, very firm, very sticky and very plastic; common fine roots; common medium and coarse masses of gypsum crystals; slightly effervescent; strongly alkaline; gradual wavy boundary.

C3—26 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate fine angular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; common fine and medium masses of lime; slightly effervescent; strongly alkaline.

The A horizon is strongly alkaline or very strongly alkaline. The C horizon is clay or silty clay.

Vida Series

The Vida series consists of deep, well drained, moderately slowly permeable soils that formed in glacial till. These soils are on glaciated uplands. Slope is 0 to 15 percent.

These soils are fine-loamy, mixed Typic Argiborolls.

Typical pedon of Vida clay loam, 2 to 8 percent slopes, in rangeland, 2,220 feet east and 845 feet north of the southwest corner of sec. 25, T. 22 N., R. 49 E.

A1—0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; neutral; clear smooth boundary.

B2t—2 to 9 inches; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; many thin very dark grayish brown clay films on horizontal and vertical faces of peds; mildly alkaline; clear wavy boundary.

B3ca—9 to 19 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, sticky and slightly plastic; many fine roots; many fine tubular pores; 5 percent pebbles; common soft medium masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—19 to 60 inches; light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; common fine tubular pores; 5 percent pebbles; few soft fine masses of lime; violently effervescent; moderately alkaline.

The mollic epipedon is 7 to 10 inches thick. Depth to the ca horizon is 7 to 10 inches. The A and B2t horizons are neutral to moderately alkaline. The B3 and C horizons are clay loam or loam.

Wabek Series

The Wabek series consists of deep, excessively drained, very rapidly permeable soils that formed in alluvium. These soils are on fans, terraces, and terrace edges and on side slopes and tops of hills and ridges on uplands. Slope is 2 to 45 percent.

These soils are sandy-skeletal, mixed Entic Haploborolls.

Typical pedon of a Wabek sandy loam in an area of Cabba-Wabek-Dast complex, 15 to 45 percent slopes, in rangeland, 670 feet north and 1,450 feet east of the southwest corner of sec. 17, T. 17 N., R. 47 E.

A1—0 to 7 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; 10 percent coarse fragments; neutral; clear wavy boundary.

IIC1ca—7 to 12 inches; light gray (10YR 7/2) very gravelly sand, grayish brown (10YR 5/2) moist; single grain; loose; common fine roots; many distinct lime coatings on lower surfaces of coarse fragments; 45 percent coarse fragments; violently effervescent; slightly alkaline; clear wavy boundary.

IIC2—12 to 60 inches; light gray (10YR 7/2) very gravelly sand, grayish brown (10YR 5/2) moist; single grain; loose; few fine roots; few faint lime coatings on lower surfaces of coarse fragments; 50 percent coarse fragments; strongly effervescent; moderately alkaline.

The mollic epipedon is 7 to 8 inches thick. Depth to very gravelly material is 7 to 15 inches. The C horizon is very gravelly loamy sand or very gravelly sand.

Weingart Series

The Weingart series consists of moderately deep, well drained, salt- and sodium-affected, very slowly permeable soils that formed in material derived from semiconsolidated shale. These soils are on foot slopes and lower side slopes of uplands. Slope is 2 to 8 percent.

These soils are fine, montmorillonitic Borollic Natrargids.

Typical pedon of Weingart clay, 2 to 8 percent slopes, in rangeland, 1,260 feet east and 780 feet south of the northwest corner of sec. 11, T. 26 N., R. 48 E.

A1—0 to 1 inch; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive;

slightly hard, very friable, nonsticky and nonplastic; few fine roots; many fine vesicular pores; 10 percent pebbles on the surface; mildly alkaline; abrupt smooth boundary.

B2t—1 inch to 9 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium prismatic structure; very hard, firm, sticky and plastic; many fine roots; common fine tubular pores; common thin clay films on vertical faces of peds; few threadlike masses of lime; slightly effervescent; very strongly alkaline; clear wavy boundary.

B3cs—9 to 21 inches; olive gray (5Y 5/2) silty clay, olive gray (5Y 4/2) moist; moderate fine and medium prismatic structure parting to moderate fine subangular blocky; very hard, friable, sticky and plastic; many fine roots; many fine and medium masses of gypsum crystals; few threadlike masses of lime; slightly effervescent; moderately alkaline; clear wavy boundary.

C1cs—21 to 30 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 4/2) moist; massive; hard, friable, sticky and plastic; many fine roots in cracks; common distinct brownish yellow cutans; common fine masses of gypsum crystals; 75 percent soft shale fragments; slightly effervescent; moderately alkaline; gradual wavy boundary.

C2r—30 to 60 inches; light olive gray (5Y 6/2) semiconsolidated very thinly bedded shale that crushes to silty clay, olive (5Y 4/3) moist; hard, firm, sticky and plastic; moderately alkaline.

Depth to semiconsolidated shale is 20 to 40 inches. The control section is silty clay or clay.

Williams Series

The Williams series consists of deep, well drained, moderately slowly permeable soils that formed in glacial till. These soils are on glaciated uplands. Slope is 0 to 4 percent.

These soils are fine-loamy, mixed Typic Argiborolls.

Typical pedon of a Williams loam in an area of Williams-Vida complex, 2 to 4 percent slopes, in cropland, 2,400 feet west and 50 feet south of the northeast corner of sec. 28, T. 23 N., R. 49 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; 5 percent pebbles; mildly alkaline; abrupt smooth boundary.

B2t—8 to 15 inches; dark grayish brown (2.5Y 4/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure; slightly hard, very friable, sticky and plastic; many fine roots; few thin clay films on vertical faces of peds; 5 percent pebbles; moderately alkaline; clear wavy boundary.

B3ca—15 to 23 inches; brown (10YR 5/3) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure; slightly hard, friable, sticky and plastic; many fine roots; many distinct lime coatings on horizontal and vertical faces of peds and common distinct lime coatings on gravel; 5 percent pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—23 to 37 inches; light gray (5Y 7/2) clay loam, olive (5Y 5/3) moist; massive; hard, friable, sticky and plastic; common fine roots; common distinct lime coatings on gravel; 5 percent pebbles; common threadlike masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

C2ca—37 to 60 inches; light olive gray (5Y 6/2) clay loam, olive (5Y 4/3) moist; massive; hard, firm, sticky and plastic; few fine roots; 5 percent pebbles; common threadlike masses of lime; strongly effervescent; moderately alkaline.

The mollic epipedon is 8 to 15 inches thick. Depth to carbonates is more than 10 inches. The B3ca and C horizons are clay loam or loam.

Yamac Series

The Yamac series consists of deep, well drained, moderately permeable soils that formed in alluvium. These soils are on uplands. Slope is 0 to 25 percent.

These soils are fine-loamy, mixed Borollic Camborthids.

Typical pedon of Yamac loam, 8 to 15 percent slopes, in rangeland, 670 feet east and 80 feet north of the southwest corner of sec. 28, T. 26 N., R. 43 E.

A1—0 to 4 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; mildly alkaline; clear wavy boundary.

B2—4 to 11 inches; olive (5Y 5/3) loam, olive (5Y 4/3) moist; moderate medium prismatic structure parting to moderate fine and medium angular blocky; slightly hard, friable, slightly sticky and plastic; many fine roots; many fine tubular pores; slightly effervescent; mildly alkaline; gradual wavy boundary.

B3ca—11 to 19 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure; slightly hard, friable, slightly sticky and plastic; many fine roots; many fine tubular pores; common soft threadlike masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C1ca—19 to 34 inches; pale olive (5Y 6/3) loam, olive (5Y 4/3) moist; weak coarse prismatic structure; hard, friable, slightly sticky and slightly plastic;

common fine roots; many fine tubular pores; few distinct white lime coatings on faces of peds; common soft threadlike masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—34 to 48 inches; pale olive (5Y 6/4) loam, olive (5Y 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; common threadlike masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

C3—48 to 60 inches; pale olive (5Y 6/4) light loam, olive (5Y 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine roots; common fine tubular pores; strongly effervescent; strongly alkaline.

The solum is 13 to 19 inches thick. The 10- to 40-inch control section is loam or clay loam. The A horizon is mildly alkaline or moderately alkaline.

Yawdim Series

The Yawdim series consists of shallow, well drained, slowly permeable soils that formed in material derived from semiconsolidated shale. These soils are on uplands. Slope is 2 to 45 percent.

These soils are clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents.

Typical pedon of Yawdim silty clay, 2 to 8 percent slopes, in rangeland, 1,812 feet east and 2,443 feet north of the southwest corner of sec. 3, T. 26 N., R. 48 E.

A1—0 to 6 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine angular blocky structure; slightly hard, very friable, sticky and plastic; many fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—6 to 15 inches; light olive gray (5Y 6/2) silty clay, olive gray (5Y 5/2) moist; massive; hard, friable, sticky and plastic; many fine roots; common distinct brownish yellow cutans; common threadlike masses of lime; 80 percent soft shale fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C2rcsca—15 to 22 inches; light olive gray (5Y 6/2) semiconsolidated shale that crushes to silty clay, olive gray (5Y 4/2) moist; hard, firm, sticky and plastic; common fine roots in cracks and along bedding planes; common fine masses of gypsum crystals; common threadlike masses of lime; slightly effervescent; moderately alkaline; clear wavy boundary.

C3rcs—22 to 60 inches; light olive gray (5Y 6/2) semiconsolidated shale that crushes to silty clay, olive (5Y 4/3) moist; hard, firm, sticky and plastic; few fine roots in cracks and along bedding planes; common fine masses of gypsum crystals; moderately alkaline.

Semiconsolidated shale is at a depth of 10 to 20 inches.

Yetull Series

The Yetull series consists of deep, somewhat excessively drained, rapidly permeable soils that formed in sandy alluvial and eolian material. These soils are on fans, foot slopes, and side slopes of hills and ridges on uplands. Slope is 2 to 15 percent.

These soils are mixed, frigid Ustic Torripsamments.

Typical pedon of a Yetull fine sandy loam in an area of Twilight-Yetull fine sandy loams, 8 to 15 percent slopes, in rangeland, 2,036 feet east and 2,000 feet north of the southwest corner of sec. 3, T. 19 N., R. 45 E.

A1—0 to 6 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; slightly effervescent; mildly alkaline; clear wavy boundary.

C1—6 to 9 inches; light brownish gray (10YR 6/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose; many fine roots; strongly effervescent; mildly alkaline; gradual wavy boundary.

C2—9 to 60 inches; light brownish gray (10YR 6/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose; few fine roots; slightly effervescent; mildly alkaline.

The C horizon is loamy sand or sand.

Zahill Series

The Zahill series consists of deep, well drained, moderately slowly permeable soils that formed in glacial till. These soils are on glaciated uplands. Slope is 2 to 45 percent.

These soils are fine-loamy, mixed (calcareous), frigid Typic Ustorthents.

Typical pedon of Zahill loam, 2 to 8 percent slopes, in cropland, 300 feet south and 1,870 feet east of the northwest corner of sec. 31, T. 23 N., R. 49 E.

Ap—0 to 6 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; weak very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C1ca—6 to 22 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak medium and coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; 5 percent pebbles; common faint lime

coatings on lower surfaces of pebbles; many fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—22 to 60 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; 5 percent pebbles; many distinct lime coatings on lower surfaces of pebbles; many fine and medium masses of lime; violently effervescent; moderately alkaline.

The C horizon is loam or clay loam.

Geology

By Eddie Juvan, geologist, Soil Conservation Service.

McCone County is bounded on the north by the Missouri River. With the exception of a small area in the southeastern part of T. 17 N., R. 49 E., the county lies entirely within the drainage basins of Redwater River, Big Dry Creek, and several shorter tributaries of the Missouri River, including Prairie Elk and Sand Creeks.

Elevation generally decreases from the southern boundary of the county to the Missouri River. The Sheep Mountain divide, between the Yellowstone and Missouri Rivers, crosses the extreme southeastern part of the county. The altitude of this divide is 3,300 feet. The elevation along the Missouri River at the McCone-Richland County line is 1,960 feet. Total relief in McCone County is 1,340 feet. The Horse Creek Divide separates Big Dry Creek and Redwater River. Redwater River drains the eastern half of the county, and Big Dry Creek drains the western half.

Barren, steep areas of badland are common in parts of the county. The Dry Creek Badland, near the western boundary, extends several miles east of Big Dry Creek and the eastern arm of the Fort Peck Reservoir. Small tracts of Badland are on the breaks of the Missouri and Redwater Rivers and along Hungry, Prairie Elk, and Sand Creeks. The higher parts of the northwestern slope of the Sheep Mountain Divide are also rugged.

Most of the county is characterized by rolling hills and long, gentle slopes. The upland areas have varied features such as glacial plains, isolated buttes, small mesas and benches, gravel deposits, and masses of rock fused or baked by the burning of adjacent coalbeds. The major valleys are wide and open and are characterized by broad alluvial flats in which meandering stream channels are entrenched to a depth of 30 feet. The alluvial valleys commonly are bordered by low bluffs 20 to 70 feet high. The bottom land of the Missouri River includes a wide flood plain and remnants of low terraces.

The present land surfaces in the county reflect long periods of sedimentation and erosion. Many stratigraphic units are exposed at the surface. As the level of the seas that covered much of Montana hundreds of millions of years ago fluctuated, alternating deposits of sand, mud, and lime were laid down. These deposits over a period of time became compacted, cemented, and hardened as they changed from mud and sand into shale and sandstone.

The deposits of sediment were nearly horizontal when they were deposited, and they remained so until late Eocene, about 30 million years ago. They have since been tilted, folded, and faulted. This deformation occurred after the deposition of the highest beds of the Tongue River and before the development of the Flaxville Plain. Except in a narrow zone along a monoclinal fold extending southwestward from Weldon and along the Poplar anticline in the northeastern corner of the county, the strata of bedrock appear to be horizontal. However, the county lies in a broad syncline. The syncline, whose axis crosses the southern townships of the county, is about 250 miles long. It extends westward to Fergus County and eastward to Fallon County. The western extension of the syncline is known as the Blood Creek syncline, and the eastern extension is known as the sheep Mountain syncline. Dips toward the axis of the syncline generally are less than 1 degree. Dips along the Weldon monocline are 1 to 3 degrees. The dip of the monocline is plainly visible near the old stage road in the northwestern part of T. 21 N., R. 46 E. and in T. 20 N., R. 44 E. Faulting can also be seen in the area just east of Weldon.

Rocks along Redwater River in the northeastern townships are part of the Poplar anticline. The bedrock in this area has a southwesterly dip of 2 to 3 degrees.

After deformation of the rock in northeastern Montana and adjacent parts of Canada, four erosional surfaces developed. The highest surface, and therefore the oldest, is the Cypress Plain. The gravel on this surface contains remains of Oligocene land animals. Below the Cypress Plain is the Flaxville Plain, which has yielded Miocene or early Pliocene mammalian remains. A third surface, which is younger than the Flaxville Plain, developed during late Pliocene and early Pleistocene. The fourth stage of erosion in northeastern Montana began in early Pleistocene and resulted in the development of the lowest terrace along the Missouri River. The Missouri River then incised the valley 100 feet deep or more. This process was interrupted by the movement of a great glacial ice sheet into the northern part of McCone County (*4*).

All rock exposed in McCone County is of sedimentary origin, and it ranges in age from Upper Cretaceous to Recent (*6*). The Marine Bearpaw Shale (Upper Cretaceous) is the oldest formation that outcrops in the county. It is overlain by the Fox Hills Sandstone (Upper

Cretaceous) that is chiefly marine and is overlain by about 900 feet of nonmarine shale and sandstone of the Lance Formation. The youngest bedrock formation exposed in the county is the Fort Union beds, which are more than 700 feet thick. The Fort Union beds consist of layers of dark shale with alternate thick layers of white sandy clay and sandstone and coalbeds. Deposits ranging in age from Oligocene to Recent form a thin mantle over the eroded bedrock surfaces. These deposits include loess, morainal material, terrace gravel, and alluvial fill along the streams.

The Bearpaw Shale is exposed south of the Missouri River, near the northwestern corner of the county. It extends eastward along the river and several miles up Big Dry and Prairie Elk Creeks. The part of the Bearpaw Shale that appears at the surface is 420 feet thick. Because of its synclinal structure, the Bearpaw Shale disappears below the flood plain of the Missouri River, near Wolf Point, and reappears as a narrow strip near the eastern boundary of the county. The Bearpaw Shale is dark gray marine material that is sandy in the upper part. Representative soils that formed in material derived from Bearpaw Shale are those of the Gerdrum, Neldore, Marias, Bascovy, Marvan, and Vanda series. The Bearpaw Shale is not considered to be a ground water aquifer in this county. Any water available in the Bearpaw Shale is unsuitable for most uses.

Toward the end of the Cretaceous, forces in the earth caused the uplift of the ancestral Rocky Mountains. Before the second phase of mountain-building, during the Middle Tertiary, these ancestral mountains were subjected to erosion that persisted until the surface was again a flat, truncated plain. Products of erosion during this period were spread for hundreds of miles over a plain east of the mountains. The Lance Formation of late Cretaceous and the Fort Union Formation of early Tertiary resulted.

The transition between the Bearpaw Shale and the Fox Hills Sandstone of the Lance Formation is gradual. The Fox Hills Sandstone crops out along the Missouri River and in Big Dry and Prairie Elk Creeks. It is composed of two parts. The basal part, which is of marine origin, is 80 to 100 feet thick and is composed chiefly of thin beds of grayish yellow sandy shale. The upper part, about 80 feet thick, is made up of massive beds that generally are cross-bedded and consist of soft, light brown sandstone containing irregularly shaped concretions of harder sandstone as much as 3 feet in diameter. Thin coalbeds are also in some places. The nonmarine origin of the upper part is indicated by the numerous remains of dinosaurs and other nonmarine vertebrates and plants in it. Soils such as those of the Fleak, Twilight, Yamac, and Yawdim series developed in material derived from this formation. The Fox Hills Sandstone is considered to be an excellent ground water aquifer. The water is soft, and wells yield as much as 90 gallons per minute.

The Hell Creek Member of the Lance Formation consists of somber-colored shale; thin interbedded sandstone, siltstone, and thin seams of coal. This bedrock is more than 400 feet thick and overlies the Fox Hills Sandstone. It outcrops along Big Dry Creek and in a broad strip of land extending eastward across the northern part of the county. Soils such as those of the Chinook, Cambeth, Absher, Gerdrum, Twilight, and Yawdim series developed in material derived from this rock. Interbedded with the sediment of the Hell Creek Member are beds of coal, which indicate the presence of swamps on the coastal plains. The skeletons of large dinosaurs, including Triceratops, commonly are discovered in buried rock of the Hell Creek Member. Beds of bentonite as much as 2 or 3 feet thick are in many areas. Volcanic ash was deposited in the marine seas, and it was chemically altered to bentonite. The sandstone and coalbeds in the Hell Creek Member are good aquifers, and wells can yield a small amount of water for domestic use and for livestock.

The Tullock Member is the upper part of the Lance Formation. It is composed of dark carbonaceous shale and coalbeds separated by light-colored sandstone, shale, and sandy shale. It is about 200 feet thick. Steep, barren side slopes and cliffs are characteristic of this member. Outcroppings of the Tullock Member form an irregular belt trending northeastward from T. 20 N., R. 43 E. to the vicinity of Sheep Creek in T. 26 N., R. 49 E., in the northeastern part of the county. Because of its synclinal structure, the belt bends and trends in a southeastward direction to Wolf Creek. Along Sand Creek, in T. 24 N., R. 47 E. and in the eastern part of the area north of T. 24 N., the Tullock Member is dominantly yellow. It has a more somber color in the western part of the county, where it can be distinguished from rock above and below by its greater resistance to weathering. Among the soils that formed in material derived from the Tullock Member are those of the Cambert, Cambeth, Barkof, Fleak, and Yawdim series.

The Fort Union Formation of Eocene age is about 1,100 feet thick in the county. It overlies the Lance Formation. It is composed of a lower part, the Lebo Shale Member, and an upper part, the Tongue River Member.

The Lebo Shale Member consists of thick beds of white sandy clay and brownish clayey sandstone alternating with layers of nearly black clay shale. The color and predominance of clay distinguishes the Lebo Member from the sandy, yellow Tongue River Member that overlies it. Outcroppings of the Lebo Shale Member form a broad belt, extending in a northeasterly direction across the county from T. 19 N., R. 43 E. through Weldon to the region northeast of Vida. The most striking exposures are at the head of Prairie Elk Creek, near Weldon. Lebo Shale beds about 200 feet thick are exposed in the barren walls of the valley, which was

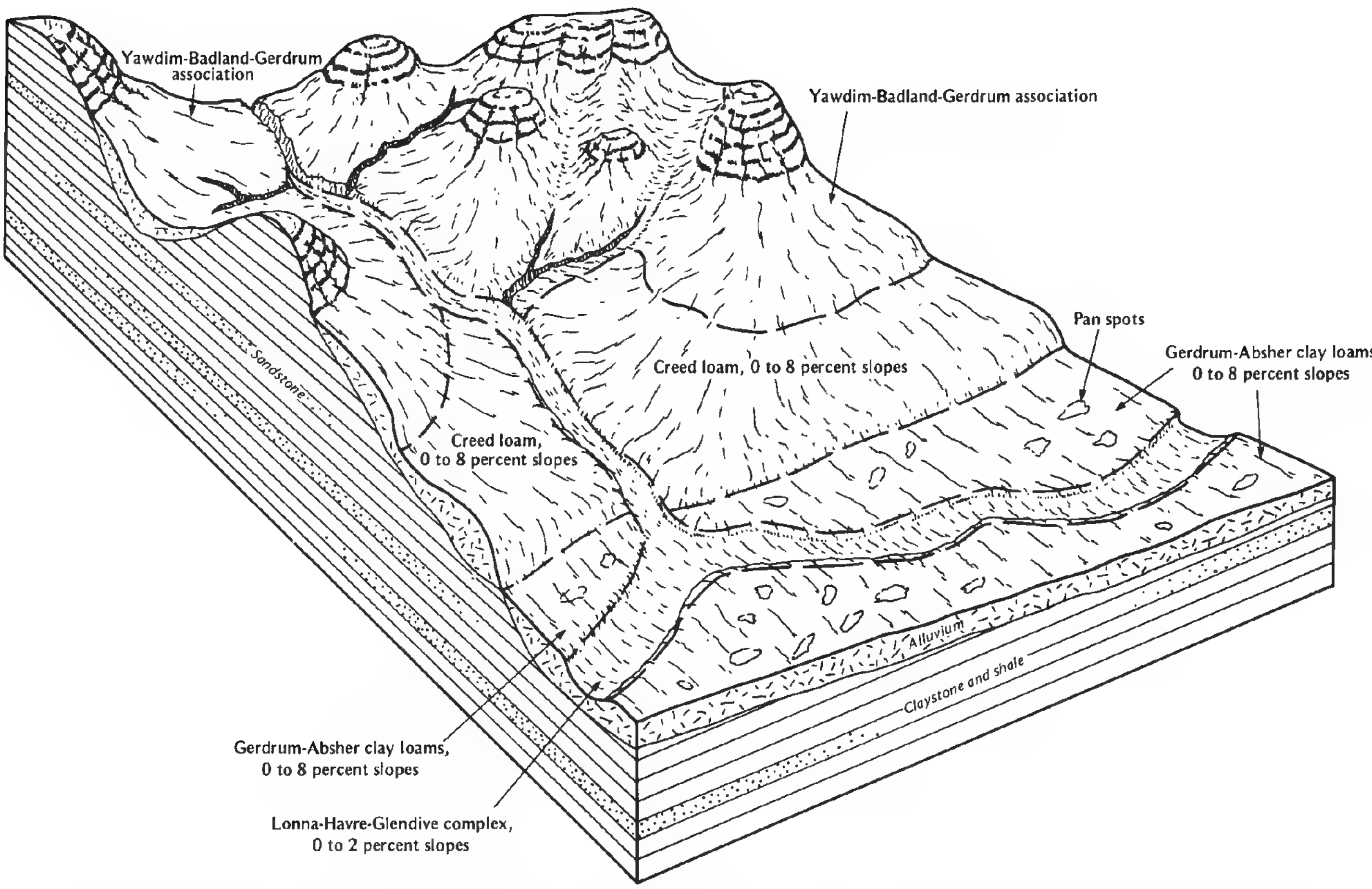

Figure 1.—Typical area of the county showing relationship of the detailed soil map units, topography, and geology in the Lebo Shale Member of the Fort Union Formation.

truncated during Pleistocene by waters flowing along the front of the Keewatin ice sheet. Except for the Big Dirty coalbed at its base, the Lebo Shale contains only a few lenses of coal. The most distinguishing characteristics of the Lebo Shale are its somber, dark color, the barren surface, and the ironstone concretions in some places. The Lebo Shale weathers to badland with occasional low, flat-topped buttes banded in shades of light to dark drab. Gerdrum, Absher, Cabbart, Fleak, Weingart, and Yawdim soils are among those that developed in material derived from this member (fig. 1).

The contact between the Lebo and Tongue River Members of the Fort Union Formation is approximately 50 feet below the most valuable coalbed in the county. The beds of the Tongue River Member are yellowish to light gray sandstone, sandy shale, coal, and scoria. About 700 feet of these beds is exposed in the county. The lower 400 feet contains at least four extensive coalbeds and several small lenses of coal. About 200 feet of the upper Tongue River Member is exposed in T. 17 N., R. 49 E., along the road from Brockway to Glendive. These beds are more uniformly light in color and are composed principally of siltstone and silty shale.

The most distinguishing characteristic of the Tongue River Member is the bright red scoria, or clinker, beds. This unusual type of rock has developed locally where thick seams of coal have burned. The burning caused baking and reddening of the overlying material. In some places the heat from burning coal was so intense that it fused shale into liquid slag. The clinker beds are along outcroppings of thick seams of coal. The red clinker deposits seldom extend far underground; however, in upland areas where the overburden was not thick, these deposits are as much as 100 feet thick. Because of the resistance of clinker beds to erosion, they commonly stand out in sharp relief and tend to develop semirugged topography. Soils that contain ash from the burned coalbeds are alkaline.

The sandstone of the Tongue River Member is massive and blocky. The outcroppings are light gray to

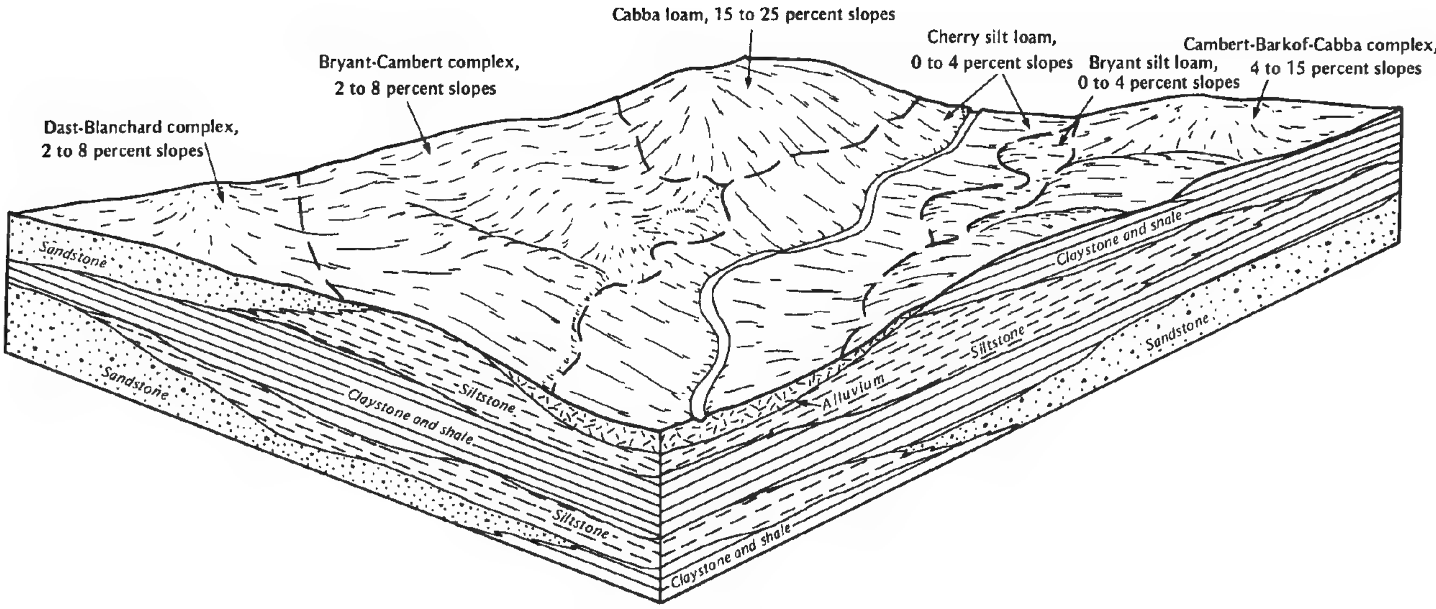

Figure 2.—Typical area of the county showing the relationship of the detailed soil map units, topography, and geology in the Tongue River Member of the Fort Union Formation.

light tan. This sandstone forms striking outcroppings and may occur as cavernous-faced cliffs that are 50 to 75 feet high and have many large knobs and sharp pinnacles. The sandstone is composed primarily of subangular quartz, but many grains of silicate minerals such as mica and feldspar are present. Some areas of the sandstone contain flakes of gypsum. The cementing material is calcium carbonate and clay. Concretions, many of which are pyrite and marcosite, are common in the sandstone. These concretions weather to brown limonite.

The sandstone of the Tongue River Member is a good ground water aquifer. Yields of 6 to 15 gallons per minute can be expected from wells. Soils that developed from the lower, coal-bearing part of the Tongue River Member include those of the Busby, Brandenberg, Cabba, Dast, Cambert, Bryant, and Barkof series. Soils that developed from the upper, silty part include those of the Bryant, Cabba, Cabbart, and Dast series (fig. 2).

Gravel deposits correlated with the Cypress Hills geomorphic surface occur on the divide crossing T. 17 N., R. 49 E. These deposits have a maximum thickness of 100 feet. The gravel deposits on Sheep Mountain, to the southwest along the divide in T. 15 N., R. 47 E., and the Little Sheep Mountain, 12 miles south of Antelope Mountain in townships 17 and 18 N., R. 50 E., all are at the same altitude as the gravel in T. 17 N., R. 49 E. Sheep Mountain and Antelope Mountain are also capped by gravel. No fossils have been found in these gravel deposits, and their correlation with the Oligocene gravel on the Cypress Hills, Saskatchewan, is based on their high topographic position. Soils of the Lehr, Wabek, and Turner series formed in these deposits.

The Flaxville Plain is primarily located north of the Missouri River; however, small remnants are south of the river. The Miocene or Pliocene terrace gravel in T. 17 N., R. 49 E. is thought to be an extension of the Flaxville Plain. This gravel is also present southeast of Redwater River and on the Horse Creek Divide. The gravel deposit in section 36, T. 25 N., R. 43 E., elevation 2,781 feet, is quartzite. The Turner soils formed in these gravel deposits.

Soils on late Pliocene and early Pleiostocene terraces are above the flood plain of the Missouri River. These terraces are 200 to 300 feet high. The flood plain is covered with waterworn, nonglacial gravel that generally is overlain by glacier drift. It is at an elevation of 2,393 to 2,515 feet. Typical Pleiostocene deposits are present in sections 6 and 29, T. 25 N., R. 47 E; section 4, T. 24 N., R. 47 E; section 32, T. 25 N., R. 42 E; and section 7, T. 24 N., R. 44 E. Among the soils that developed in these deposits are those of the Banks and Lehr series.

During the Pleistocene Epoch of the Quaternary, which began about 1 million years ago, the climate of North America became cold enough for thousands of feet of glacial ice to accumulate over most of Canada (*4*). Because of the mobility and weight of the ice, it spread southward into the northern United States. As it moved forward, it gathered soil material and loose rock. Upon melting, this material was left blanketing the land surface. These glacial deposits consist of unstratified clay, silt, and sand mixed with boulders and cobbles of

limestone, granite, and other crystalline rock. The rock is from outcroppings as distant as the Hudson Bay area and includes sandstone from local rock exposures of Cretaceous and Tertiary age. The glacial deposits extend across the county from T. 21 N., R. 40 E. on the west to T. 22 N., R. 50 E. along the eastern boundary. They are as much as 30 feet thick. Boulders can be found on the surface a few miles south of the main areas affected by glaciation. These boulders were deposited by icebergs floating beyond the advance of the glaciers. Soils that formed in glacial deposits include those of the Williams, Bowbells, Zahill, Thoeny, and Vida series.

In parts of the county, the surface is mantled by fine gravel and windblown material. These deposits consist of very fine sand and silt and generally are not stratified. Where dissected by drainageways, they are characterized by steep banks. These deposits were laid down at relatively low density and are subject to consolidation. If the soils that formed in these deposits are irrigated, settlement may become a major problem. Blanchard, Chinook, Lisk, Tally, Busby, and Yetull soils are among those that formed in these wind blown deposits.

Stratified clay, silt, sand, and gravel underlie the Missouri River flood plain. These deposits are as much as 50 feet thick. Deposits ranging from 5 to 35 feet in thickness are along the flood plain of the tributaries of the river. Locally, these deposits are an important source of ground water at a shallow depth. Many wells produce water for domestic use and livestock from this aquifer. Among the soils that formed in these recent alluvial deposits are those of the Havre, Havrelon, Lonna, Macar, Glendive, and Cherry series.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	More than 7.5

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles.

Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Codominant trees. Trees that have crowns forming the general level of the forest canopy and that receive full light from above but little from the sides.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Dominant trees. Trees that have crowns forming the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature; for example, fire that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest land. Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for nonforest use.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial melt water. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter. Very gravelly soil material is 35 to 60 percent rounded or angular rock fragments, and extremely gravelly soil material is more than 60 percent.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major

horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

A2 horizon. —A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Overstory. The trees in a forest stand that form the upper crown.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that

water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This increases the vigor and reproduction of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range. Range includes rangeland, native pasture, and many forest lands that support an understory or periodic cover of vegetation suitable for grazing.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regeneration. The new growth of a natural plant community that develops from seed or sprouts.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riparian. An area of land adjacent to a body of water and directly affected by the water. An area and a biotic community influenced by a high water table and commonly adjacent to surface water. Riparian ecosystems are diversified, widespread, and vary in size and vegetative complexity. Riparian zones have the following in common; (1) they create well defined habitat zones within much drier surroundings; (2) they make up a minor proportion of the overall area; (3) they generally are more productive per acre than the rest of the area; and (4) they are sources of diversity. Riparian zones have commonly been recognized as riparian woodland or streambank vegetation in the west.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Selection silvicultural system. A method of harvesting trees that involves the removal of mature and immature trees, either singly or in groups, at intervals. Regeneration is established almost continuously and an uneven-aged stand is maintained.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shelterwood silvicultural system. A method of harvesting trees that involves removing the stand in a series of cuts. Regeneration occurs under a partial forest canopy. After regeneration is established, a final harvest cut removes the shelterwood and permits the stand to develop in the open as an even-aged stand.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Skid trail. The pathway along which logs are moved from the woods to a common site for loading onto a logging truck.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity are—

	SAR
Slight	Less than 13:1
Moderate	13-30:1
Strong	More than 30:1

Soft bedrock. Bedrock that can be excavated using a single-toothed ripping attachment mounted on a tractor with a 200 to 300 drawbar horsepower rating. (See rippable.)

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Woodland suitability group. A grouping of soils that are capable of producting similar kinds and amounts of wood crops and that require similar management to produce those crops.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1959-78 at Brockway, Mont.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.1 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	23.6	-0.7	11.5	53	-39	17	0.29	0.06	0.46	1	5.0
February---	32.3	9.0	20.7	58	-26	19	0.19	---	0.32	1	1.0
March------	41.9	16.8	29.4	76	-22	88	0.36	0.11	0.55	1	3.0
April------	56.1	28.9	42.5	83	4	161	1.11	0.32	1.74	4	0.5
May--------	67.9	39.0	53.5	93	22	419	2.24	0.91	3.30	5	0.0
June-------	77.7	48.2	63.0	97	31	690	2.76	1.05	4.14	5	0.0
July-------	86.2	52.3	69.3	104	37	908	1.70	0.68	2.52	4	0.0
August-----	85.4	50.2	67.8	102	33	862	1.30	0.34	2.05	3	0.0
September--	72.9	39.8	56.5	97	20	506	1.40	0.37	2.22	3	0.0
October----	60.5	29.7	45.2	86	7	207	0.60	0.07	0.99	2	0.0
November---	42.1	17.0	29.6	71	-17	20	0.29	0.03	0.48	1	1.8
December---	29.9	6.8	18.4	57	-36	18	0.27	0.03	0.45	1	1.0
Yearly:											
Average--	56.4	28.1	42.3	---	---	---	---	---	---	---	---
Extreme--	---	---	---	104	-39	---	---	---	---	---	---
Total	---	---	---	---	---	3,915	12.51	9.47	15.35	31	12.3

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded in the period 1963-78 at Circle, Mont.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.1 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	22.8	0.1	11.5	49	-37	22	0.60	0.14	0.96	2	10.5
February---	31.6	8.8	20.2	56	-25	23	0.27	0.03	0.45	1	4.8
March------	40.7	16.9	28.8	73	-21	65	0.56	0.26	0.80	2	5.7
April------	55.6	30.6	43.1	81	4	169	1.45	0.44	2.25	4	3.4
May--------	68.2	40.7	54.5	93	23	450	2.33	0.92	3.47	6	0.3
June-------	77.7	50.3	64.0	98	35	720	3.14	1.60	4.40	6	0.0
July-------	86.1	54.8	70.5	103	38	946	1.90	1.11	2.59	4	0.0
August-----	84.5	52.5	68.5	102	35	884	1.40	0.38	2.20	3	0.0
September--	72.4	42.0	57.3	97	24	528	1.31	0.38	2.05	3	0.0
October----	60.4	31.2	45.8	85	11	235	0.70	0.07	1.17	2	0.9
November---	41.1	17.6	29.4	69	-13	20	0.46	0.12	0.71	2	4.1
December---	28.1	6.5	17.3	55	-34	11	0.56	0.19	0.84	2	6.6
Yearly:											
Average--	55.8	29.3	42.6	---	---	---	---	---	---	---	---
Extreme--	---	---	---	104	-37	---	---	---	---	---	---
Total	---	---	---	---	---	4,073	14.68	12.09	17.34	37	36.3

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded in the period 1951-78 at Vida, Mont.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.1 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January---	21.5	1.1	11.3	51	-33	22	0.73	0.25	1.11	3	10.5
February--	29.5	8.8	19.2	57	-25	24	0.55	0.16	0.85	2	7.1
March-----	38.8	16.8	27.8	72	-20	85	0.70	0.27	1.03	3	7.2
April-----	55.1	30.3	42.7	84	7	170	1.63	0.58	2.47	5	6.7
May-------	68.0	41.5	54.7	93	22	456	2.45	0.83	3.73	6	0.7
June------	76.6	50.3	63.5	97	37	705	3.22	1.73	4.42	7	0.0
July------	84.7	55.7	70.2	104	41	936	2.07	0.69	3.16	5	0.0
August----	84.1	54.1	69.1	102	39	902	1.56	0.36	2.50	3	0.0
September-	71.6	43.6	57.6	96	24	533	1.41	0.33	2.26	4	0.2
October---	60.1	33.9	47.0	87	14	260	0.80	0.16	1.29	2	2.3
November--	41.2	19.7	30.4	70	-12	57	0.49	0.14	0.76	2	5.2
December--	29.5	9.6	19.6	56	-30	34	0.51	0.20	0.75	2	7.0
Yearly:											
Average-	55.1	30.5	42.8	---	---	---	---	---	---	---	---
Extreme-	---	---	---	104	-33	---	---	---	---	---	---
Total---	---	---	---	---	---	4,184	16.12	12.08	19.86	44	46.9

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded in the period 1951-77 at Fort Peck, Mont.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.1 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January---	22.5	2.1	12.3	52	-33	21	0.38	0.06	0.62	1	5.1
February--	29.5	9.0	19.3	56	-25	30	0.23	0.07	0.34	1	1.8
March-----	40.7	19.5	30.1	71	-16	92	0.34	0.11	0.51	1	6.7
April-----	55.7	32.9	44.3	80	11	186	1.00	0.26	1.59	3	0.0
May-------	68.7	43.7	56.2	91	28	502	1.95	0.58	3.04	4	0.0
June------	78.2	52.8	65.5	96	38	765	2.67	1.57	3.64	5	0.0
July------	86.4	57.6	72.1	103	44	995	1.71	0.72	2.50	4	0.0
August----	85.4	55.9	70.7	101	42	952	1.49	0.29	2.41	3	0.0
September-	72.5	45.8	59.2	95	27	576	1.24	0.14	2.04	2	0.0
October---	60.4	36.7	48.6	85	18	290	0.63	0.11	1.03	2	0.0
November--	42.2	22.4	32.3	67	-10	38	0.29	---	0.48	1	0.0
December--	29.9	10.4	20.2	55	-29	28	0.21	0.07	0.31	0	0.0
Yearly:											
Average-	56.0	32.4	44.2	---	---	---	---	---	---	---	---
Extreme-	---	---	---	103	-33	---	---	---	---	---	---
Total---	---	---	---	---	---	4,475	12.14	8.98	15.08	27	13.6

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1959-78 at Brockway, Mont.]

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 17	May 26	June 11
2 years in 10 later than--	May 11	May 21	June 4
5 years in 10 later than--	May 1	May 11	May 20
First freezing temperature in fall:			
1 year in 10 earlier than--	September 12	September 3	August 28
2 years in 10 earlier than--	September 17	September 9	September 2
5 years in 10 earlier than--	September 28	September 19	September 12

[Recorded in the period 1963-78 at Circle, Mont.]

Probability	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 9	May 19	May 28
2 years in 10 later than--	May 5	May 14	May 23
5 years in 10 later than--	April 27	May 5	May 13
First freezing temperature in fall:			
1 year in 10 earlier than--	September 14	September 6	September 5
2 years in 10 earlier than--	September 21	September 12	September 10
5 years in 10 earlier than--	October 5	September 24	September 19

TABLE 2.--FREEZE DATES IN SPRING AND FALL--Continued
[Recorded in the period 1951-78 at Vida, Mont.]

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 11	May 20	May 31
2 years in 10 later than--	May 6	May 14	May 25
5 years in 10 later than--	April 26	May 3	May 14
First freezing temperature in fall:			
1 year in 10 earlier than--	September 24	September 13	September 4
2 years in 10 earlier than--	September 30	September 19	September 9
5 years in 10 earlier than--	October 11	October 1	September 20

[Recorded in the period 1956-78 at Fort Peck, Mont.]

Probability	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 3	May 10	May 19
2 years in 10 later than--	April 29	May 6	May 14
5 years in 10 later than--	April 19	April 27	May 4
First freezing temperature in fall:			
1 year in 10 earlier than--	October 1	September 18	September 14
2 years in 10 earlier than--	October 7	September 24	September 19
5 years in 10 earlier than--	October 19	October 7	September 28

TABLE 3.--GROWING SEASON

[Recorded in the period 1959-78 at Brockway, Mont.]

Probability	Length of growing season if daily minimum temperature exceeds--		
	24° F	28° F	32° F
	Days	Days	Days
9 years in 10	129	106	81
8 years in 10	136	114	92
5 years in 10	149	131	113
2 years in 10	163	147	135
1 year in 10	169	156	146
[Recorded in the period 1963-78 at Circle, Mont.]			
9 years in 10	134	114	105
8 years in 10	143	123	112
5 years in 10	160	141	127
2 years in 10	178	160	144
1 year in 10	192	174	156
[Recorded in the period 1951-78 at Vida, Mont.]			
9 years in 10	142	129	107
8 years in 10	151	136	114
5 years in 10	168	150	128
2 years in 10	184	163	142
1 year in 10	193	170	149
[Recorded in the period 1956-78 Fort Peck, Mont.]			
9 years in 10	163	145	128
8 years in 10	170	151	134
5 years in 10	182	163	147
2 years in 10	194	174	159
1 year in 10	200	180	165

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Absher clay loam, 8 to 15 percent slopes	1,880	0.1
2	Adger silty clay loam, 0 to 8 percent slopes	1,900	0.1
3	Adger-Absher complex, 0 to 8 percent slopes	1,240	0.1
4	Aeric Fluvaquents, loamy	2,785	0.2
5	Alona silt loam, 0 to 8 percent slopes	15,055	0.9
6	Alona silt loam, saline, 0 to 2 percent slopes	4,465	0.3
7	Badland	35,685	2.1
8	Banks fine sandy loam	2,240	0.1
9	Barkof silty clay, 2 to 8 percent slopes	1,285	0.1
10	Bascovy silty clay, 2 to 8 percent slopes	420	*
11	Bascovy-Sunburst complex, 15 to 45 percent slopes	5,330	0.3
12	Benz clay loam, 0 to 8 percent slopes	1,845	0.1
13	Bowbells loam	1,395	0.1
14	Bryant silt loam, 0 to 4 percent slopes	33,790	2.0
15	Bryant silt loam, 4 to 8 percent slopes	6,605	0.4
16	Bryant-Cambert complex, 2 to 8 percent slopes	51,140	3.1
17	Bryant Variant silt loam, 0 to 2 percent slopes	1,215	0.1
18	Busby fine sandy loam, 2 to 8 percent slopes	2,510	0.2
19	Busby fine sandy loam, 8 to 15 percent slopes	1,260	0.1
20	Busby-Fleak complex, 15 to 45 percent slopes	24,760	1.5
21	Busby-Twilight fine sandy loams, 2 to 8 percent slopes	3,305	0.2
22	Busby-Twilight-Fleak complex, 8 to 15 percent slopes	14,650	0.9
23	Busby-Yamac-Fleak complex, 15 to 45 percent slopes	31,100	1.9
24	Busby-Yetull fine sandy loams, 2 to 8 percent slopes	2,210	0.1
25	Cabba loam, 15 to 25 percent slopes	11,055	0.7
26	Cabba-Badland complex, 15 to 45 percent slopes	17,870	1.1
27	Cabba-Barkof complex, 15 to 45 percent slopes	2,930	0.2
28	Cabba-Brandenburg complex, 8 to 45 percent slopes	2,715	0.2
29	Cabba-Dast complex, 15 to 45 percent slopes	11,950	0.7
30	Cabba-Wabek-Dast complex, 15 to 45 percent slopes	15,455	0.9
31	Cabbart silt loam, 15 to 25 percent slopes	15,365	0.9
32	Cabbart-Badland complex, 15 to 45 percent slopes	41,945	2.5
33	Cabbart-Kirby complex, 8 to 45 percent slopes	7,425	0.4
34	Cabbart-Twilight complex, 15 to 45 percent slopes	17,700	1.1
35	Cabbart-Yawdim complex, 4 to 15 percent slopes	11,030	0.7
36	Cabbart-Yawdim complex, 15 to 45 percent slopes	8,285	0.5
37	Cambert loam, 2 to 8 percent slopes	87,625	5.3
38	Cambert-Barkof-Cabba complex, 4 to 15 percent slopes	9,105	0.5
39	Cambert-Cabba loams, 8 to 15 percent slopes	44,585	2.7
40	Cambert-Dast-Cabba complex, 4 to 15 percent slopes	50,390	3.0
41	Cambeth silt loam, 2 to 8 percent slopes	27,085	1.6
42	Cambeth-Cabbart silt loams, 8 to 15 percent slopes	17,295	1.0
43	Cambeth-Twilight-Cabbart complex, 4 to 15 percent slopes	36,910	2.2
44	Cherry silt loam, 0 to 4 percent slopes	39,945	2.4
45	Cherry-Havrelon-Trembles complex, 0 to 2 percent slopes	16,390	1.0
46	Chinook fine sandy loam, 0 to 4 percent slopes	3,620	0.2
47	Chinook fine sandy loam, 4 to 8 percent slopes	8,530	0.5
48	Chinook fine sandy loam, 8 to 15 percent slopes	830	*
49	Chinook fine sandy loam, gullied, 2 to 8 percent slopes	2,045	0.1
50	Creed loam, 0 to 8 percent slopes	14,900	0.9
51	Creed-Gerdrum complex, 0 to 8 percent slopes	8,615	0.5
52	Dast fine sandy loam, 2 to 8 percent slopes	7,735	0.5
53	Dast fine sandy loam, 8 to 15 percent slopes	5,300	0.3
54	Dast-Blanchard complex, 2 to 8 percent slopes	1,005	0.1
55	Dast-Blanchard complex, 8 to 25 percent slopes	3,650	0.2
56	Dimmick silty clay	1,480	0.1
57	Dimmick clay, drained	920	0.1
58	Ethridge silty clay loam, 0 to 4 percent slopes	4,875	0.3
59	Ethridge silty clay loam, 4 to 8 percent slopes	1,350	0.1
60	Evanston loam, 0 to 2 percent slopes	1,825	0.1
61	Evanston loam, 2 to 8 percent slopes	2,645	0.2
62	Evanston-Gerdrum complex, 2 to 8 percent slopes	4,735	0.3
63	Farland silt loam, 0 to 4 percent slopes	2,015	0.1
64	Farnuf loam, 0 to 4 percent slopes	5,105	0.3
65	Floweree silt loam, 0 to 4 percent slopes	18,780	1.1
66	Floweree silt loam, 4 to 8 percent slopes	6,855	0.4
67	Floweree-Cambeth silt loams, 2 to 8 percent slopes	24,700	1.5
68	Gerdrum clay loam, 0 to 8 percent slopes	20,705	1.2
69	Gerdrum clay loam, gullied, 8 to 15 percent slopes	2,235	0.1
70	Gerdrum-Absher clay loams, 0 to 8 percent slopes	12,810	0.8

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
71	Gerdrum-Yawdim-Fleak complex, 0 to 8 percent slopes	1,950	0.1
72	Gerdrum-Yawdim-Fleak complex, 8 to 45 percent slopes	3,715	0.2
73	Glendive sandy loam	1,060	0.1
74	Glendive loam	3,395	0.2
75	Glendive loam, protected	450	*
76	Glendive silty clay loam	375	*
77	Glendive silty clay loam, protected	960	0.1
78	Glendive-Hanly complex, protected	720	*
79	Hanly loamy fine sand	2,110	0.1
80	Harlem silty clay	805	*
81	Harlem silty clay, protected	5,870	0.4
82	Havre silt loam	3,530	0.2
83	Havre silt loam, protected	675	*
84	Havre silty clay loam	300	*
85	Havre silty clay loam, protected	3,000	0.2
86	Havrelon loam	8,300	0.5
87	Havrelon loam, protected	1,815	0.1
88	Havrelon loam, saline	2,735	0.2
89	Havrelon silty clay loam	1,260	0.1
90	Havrelon silty clay loam, protected	3,040	0.2
91	Hillon loam, 2 to 8 percent slopes	1,785	0.1
92	Hillon loam, 8 to 15 percent slopes	5,980	0.4
93	Hillon loam, 15 to 45 percent slopes	7,020	0.4
94	Hillon-Badland complex, 15 to 45 percent slopes	2,335	0.1
95	Hillon-Yamac-Fleak complex, 15 to 45 percent slopes	10,750	0.6
96	Hoffmanville silty clay, protected	300	*
97	Kremlin loam, 0 to 4 percent slopes	5,300	0.3
98	Kremlin loam, 4 to 8 percent slopes	5,315	0.3
99	Lehr loam, 2 to 8 percent slopes	4,055	0.2
100	Lisk sandy loam, 2 to 8 percent slopes	2,615	0.2
101	Lisk sandy loam, 8 to 15 percent slopes	1,170	0.1
102	Lohler silty clay loam, protected	2,260	0.1
103	Lohler silty clay	235	*
104	Lohler silty clay, protected	700	*
105	Lonna silty clay loam, 0 to 4 percent slopes	10,000	0.6
106	Lonna-Havre-Glendive complex, 0 to 2 percent slopes	12,865	0.8
107	Macar loam, 0 to 4 percent slopes	9,430	0.6
108	Macar loam, 4 to 8 percent slopes	10,200	0.6
109	Macar loam, 8 to 15 percent slopes	750	*
110	Macar loam, saline, 0 to 4 percent slopes	925	0.1
111	Macar-Cabba loams, 8 to 15 percent slopes	1,490	0.1
112	Macar-Cambert loams, 2 to 8 percent slopes	14,085	0.8
113	Marias clay	1,410	0.1
114	Marvan clay, 0 to 8 percent slopes	3,740	0.2
115	Neldore-Badland-Bascovy complex, 15 to 45 percent slopes	9,325	0.6
116	Neldore-Bascovy complex, 2 to 15 percent slopes	3,060	0.2
117	Neldore-Yamac-Badland complex, 15 to 45 percent slopes	3,860	0.2
118	Pendroy clay	2,120	0.1
119	Ridgelawn silt loam	1,155	0.1
120	Rominell loam, 0 to 8 percent slopes	11,510	0.7
121	Rominell loam, gullied, 0 to 8 percent slopes	13,035	0.8
122	Rominell-Yamac loams, 4 to 15 percent slopes	855	0.1
123	Savage silty clay loam, 0 to 4 percent slopes	2,055	0.1
124	Shambo loam, 0 to 4 percent slopes	15,825	1.0
125	Shambo loam, 4 to 8 percent slopes	8,685	0.5
126	Shambo-Cabba loams, 8 to 15 percent slopes	1,380	0.1
127	Shambo-Cambert loams, 2 to 8 percent slopes	38,680	2.3
128	Sunburst clay loam, 2 to 8 percent slopes	865	0.1
129	Sunburst clay loam, 8 to 15 percent slopes	2,400	0.1
130	Sunburst clay loam, 15 to 45 percent slopes	6,675	0.4
131	Tally fine sandy loam, 0 to 4 percent slopes	2,070	0.1
132	Tally fine sandy loam, 4 to 8 percent slopes	2,420	0.1
133	Telstad loam, 2 to 8 percent slopes	4,935	0.3
134	Telstad-Hillon loams, 2 to 8 percent slopes	14,550	0.9
135	Telstad-Hillon loams, 8 to 15 percent slopes	1,830	0.1
136	Telstad-Thoeny loams, 2 to 8 percent slopes	1,015	0.1
137	Thoeny loam, 2 to 8 percent slopes	6,010	0.4
138	Thoeny-Absher complex, 2 to 8 percent slopes	2,680	0.2
139	Trembles fine sandy loam	5,880	0.4
140	Trembles fine sandy loam, protected	660	*

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
141	Turner loam, 0 to 4 percent slopes	850	0.1
142	Twilight-Yetull fine sandy loams, 8 to 15 percent slopes	4,645	0.3
143	Typic Fluvaquents, frequently flooded	4,895	0.3
144	Typic Fluvaquents, saline	17,085	1.0
145	Typic Ustifluvents, saline	1,420	0.1
146	Typic Ustorthents-Typic Ustifluvents association	13,300	0.8
147	Ustic Torriorthents-Ustic Torrifluvents association	15,950	1.0
148	Vanda clay, 0 to 8 percent slopes	1,830	0.1
149	Vida clay loam, 0 to 2 percent slopes	3,460	0.2
150	Vida clay loam, 2 to 8 percent slopes	9,015	0.5
151	Vida-Zahill complex, 2 to 8 percent slopes	89,060	5.4
152	Vida-Zahill complex, 8 to 15 percent slopes	4,025	0.2
153	Wabek sandy loam, 4 to 15 percent slopes	790	*
154	Wabek sandy loam, 15 to 45 percent slopes	205	*
155	Weingart clay, 2 to 8 percent slopes	2,455	0.1
156	Williams loam, 0 to 2 percent slopes	12,325	0.7
157	Williams loam, 2 to 4 percent slopes	4,690	0.3
158	Williams-Vida complex, 2 to 4 percent slopes	25,020	1.5
159	Yamac loam, 0 to 4 percent slopes	3,135	0.2
160	Yamac loam, 4 to 8 percent slopes	17,085	1.0
161	Yamac loam, 8 to 15 percent slopes	4,720	0.3
162	Yamac-Twilight complex, 2 to 8 percent slopes	5,640	0.3
163	Yamac-Twilight-Fleak complex, 8 to 15 percent slopes	7,995	0.5
164	Yawdim silty clay, 2 to 8 percent slopes	2,825	0.2
165	Yawdim-Badland-Cabbart association	26,865	1.6
166	Yawdim-Badland-Gerdrum association	19,420	1.2
167	Yawdim-Kirby complex, 8 to 35 percent slopes	475	*
168	Zahill loam, 2 to 8 percent slopes	13,800	0.8
169	Zahill loam, 8 to 15 percent slopes	20,000	1.2
170	Zahill loam, 15 to 45 percent slopes	26,920	1.6
171	Zahill-Badland complex, 25 to 45 percent slopes	9,100	0.5
172	Zahill-Cabba loams, 8 to 15 percent slopes	19,315	1.2
173	Zahill-Cabba loams, 15 to 45 percent slopes	12,605	0.8
174	Zahill-Yawdim complex, 4 to 15 percent slopes	2,415	0.1
175	Zahill-Yawdim complex, 15 to 45 percent slopes	4,345	0.3
	Water	19,775	1.2
	Total	1,660,160	100.0

* Less than 0.05 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS

[Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay	
	N	I	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
8: Banks	---	---	---	35	---	42	---	45	---	4.0
9: Barkof	25	---	21	---	35	---	39	---	---	---
13: Bowbells	37	---	32	---	47	---	62	---	---	---
14: Bryant	32	---	27	---	41	---	53	---	---	---
15: Bryant	30	---	25	---	36	---	50	---	---	---
16: Bryant-Cambert	28	---	24	---	34	---	47	---	---	---
18: Busby	15	---	12	---	19	---	21	---	---	---
19: Busby	14	---	11	---	18	---	20	---	---	---
21: Busby-Twilight	14	---	11	---	18	---	20	---	---	---
24: Busby-Yetull	12	---	10	---	16	---	18	---	---	---
37: Cambert	26	---	22	---	32	---	43	---	---	---
38: Cambert-Barkof-Cabba	18	---	15	---	23	---	26	---	---	---
39: Cambert-Cabba	18	---	15	---	23	---	26	---	---	---
40: Cambert-Dast-Cabba	18	---	15	---	23	---	26	---	---	---
41: Cambeth	25	---	21	---	31	---	42	---	---	---
42: Cambeth-Cabbart	17	---	14	---	22	---	25	---	---	---
43: Cambeth-Twilight-Cabbart	17	---	14	---	22	---	25	---	---	---
44: Cherry	30	---	25	45	37	70	48	85	---	5.5
45: Cherry-Havrelon-Trembles	28	---	23	42	35	67	46	79	---	5.2

TABLE 5.--YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay	
	N	I	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
46 Chinook	24	---	20	---	29	---	31	---	---	---
47 Chinook	22	---	18	---	27	---	29	---	---	---
48 Chinook	15	---	12	---	19	---	21	---	---	---
50 Creed	20	---	14	---	24	---	31	---	---	---
51 Creed-Gerdrum	19	---	13	---	23	---	30	---	---	---
52 Dast	21	---	17	---	26	---	27	---	---	---
53 Dast	14	---	12	---	18	---	20	---	---	---
54 Dast-Blanchard	13	---	11	---	17	---	19	---	---	---
57 Dimmick	22	---	19	---	31	---	35	---	---	---
58 Ethridge	30	---	20	---	41	---	46	---	---	---
59 Ethridge	28	---	21	---	38	---	43	---	---	---
60 Evanston	33	---	28	---	44	---	58	---	---	---
61 Evanston	31	---	24	---	37	---	53	---	---	---
62 Evanston-Gerdrum	25	---	19	---	30	---	41	---	---	---
63 Farland	34	---	29	---	45	---	59	---	---	---
64 Farnuf	34	---	29	---	45	---	59	---	---	---
65 Floweree	31	---	26	---	40	---	52	---	---	---
66 Floweree	29	---	24	---	35	---	49	---	---	---
67 Floweree-Cambeth	27	---	23	---	33	---	46	---	---	---
68 Gerdrum	18	---	12	---	22	---	29	---	---	---

TABLE 5.--YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay	
	N	I	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
73, 74------------------- Glendive	21	---	17	40	26	50	27	65	---	4.5
75----------------------- Glendive	21	---	17	40	26	60	27	70	---	5.0
76, 77------------------- Glendive	21	---	17	42	26	62	27	70	---	5.0
78----------------------- Glendive-Hanly	---	---	---	35	---	42	---	45	---	4.0
80, 81------------------- Harlem	27	---	22	40	34	60	45	75	---	5.0
82, 83, 84, 85----------- Havre	27	---	22	40	34	70	45	90	---	5.0
86, 87------------------- Havrelon	28	---	23	40	35	70	46	90	---	5.2
89, 90------------------- Havrelon	28	---	23	45	35	70	46	90	---	5.2
91----------------------- Hillon	26	---	22	---	32	---	43	---	---	---
92----------------------- Hillon	23	---	19	---	28	---	33	---	---	---
96----------------------- Hoffmanville	25	---	21	38	31	60	36	70	---	4.3
97----------------------- Kremlin	31	---	26	---	40	---	52	---	---	---
98----------------------- Kremlin	29	---	24	---	35	---	49	---	---	---
99----------------------- Lehr	26	---	21	---	31	---	35	---	---	---
100---------------------- Lisk	22	---	18	--	27	---	28	---	---	---
101---------------------- Lisk	15	---	12	---	19	---	21	---	---	---
102, 103, 104------------ Lohler	28	---	23	45	35	60	46	80	---	5.0
105---------------------- Lonna	29	---	24	---	36	---	47	---	---	---
106---------------------- Lonna-Havre-Glendive	27	---	22	45	34	69	45	81	---	5.0
107---------------------- Macar	30	---	25	---	37	---	48	---	---	---
108---------------------- Macar	27	---	23	---	33	---	44	---	---	---

TABLE 5.--YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Winter wheat N	Winter wheat I	Spring wheat N	Spring wheat I	Barley N	Barley I	Oats N	Oats I	Alfalfa hay N	Alfalfa hay I
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
109-----------------------Macar	24	---	20	---	29	---	34	---	---	---
110-----------------------Macar	21	---	16	---	25	---	32	---	---	---
111-----------------------Macar-Cabba	20	---	17	---	25	---	28	---	---	---
112-----------------------Macar-Cambert	26	---	22	---	32	---	43	---	---	---
113-----------------------Marias	26	---	22	---	37	---	43	---	---	---
114-----------------------Marvan	18	---	12	---	22	---	29	---	---	---
118-----------------------Pendroy	22	---	19	40	31	50	35	70	---	3.5
119-----------------------Ridgelawn	26	---	22	40	32	60	37	70	---	5.0
120-----------------------Rominell	18	---	12	---	22	---	29	---	---	---
122-----------------------Rominell-Yamac	21	---	16	---	25	---	33	---	---	---
123-----------------------Savage	31	---	24	---	42	---	47	---	---	---
124-----------------------Shambo	32	---	27	---	41	---	53	---	---	---
125-----------------------Shambo	30	---	25	---	36	---	50	---	---	---
126-----------------------Shambo-Cabba	23	---	19	---	28	---	31	---	---	---
127-----------------------Shambo-Cambert	28	---	24	---	34	---	47	---	---	---
128-----------------------Sunburst	23	---	17	---	30	---	34	---	---	---
129-----------------------Sunburst	19	---	15	---	26	---	29	---	---	---
131-----------------------Tally	25	---	21	---	30	---	32	---	---	---
132-----------------------Tally	23	---	19	---	28	---	30	---	---	---
133-----------------------Telstad	32	---	25	---	38	---	54	---	---	---

TABLE 5.--YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay	
	N	I	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
134. Telstad-Hillon	29	---	24	---	35	---	49	---	---	---
135. Telstad-Hillon	26	---	21	---	31	---	37	---	---	---
136. Telstad-Thoeny	26	---	20	---	31	---	37	---	---	---
137. Thoeny	21	---	15	---	25	---	32	---	---	---
138. Thoeny-Absher	15	---	10	---	17	---	22	---	---	---
139, 140. Trembles	22	---	18	38	27	60	28	65	---	4.5
141. Turner	30	---	25	---	39	---	45	---	---	---
149. Vida	35	---	30	---	46	---	60	---	---	---
150. Vida	33	---	26	---	39	---	55	---	---	---
151. Vida-Zahill	30	---	25	---	36	---	50	---	---	---
152. Vida-Zahill	27	---	22	---	32	---	38	---	---	---
156. Williams	36	---	31	---	47	---	61	---	---	---
157. Williams	34	---	27	---	40	---	56	---	---	---
158. Williams-Vida	33	---	26	---	39	---	55	---	---	---
159. Yamac	29	---	24	---	36	---	47	---	---	---
160. Yamac	26	---	22	---	32	---	43	---	---	---
161. Yamac	23	---	19	---	28	---	33	---	---	---
162. Yamac-Twilight	20	---	17	---	25	---	28	---	---	---

TABLE 5.--YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay	
	N	I	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton
168 Zahill	27	---	23	---	33	---	44	---	---	---
169 Zahill	24	---	20	---	29	---	34	---	---	---
172 Zahill-Cabba	20	---	17	---	25	---	28	---	---	---

TABLE 6.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1 Absher	Severe: excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Severe: erodes easily.
2 Adger	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: erodes easily.
3*:				
Adger	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: erodes easily.
Absher	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
4. Aeric Fluvaquents				
5 Alona	Moderate: slope, dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
6 Alona	Severe: flooding.	Moderate: excess salt, dusty.	Moderate: dusty, excess salt.	Severe: erodes easily.
7. Badland				
8 Banks	Severe: flooding.	Slight	Slight	Slight.
9 Barkof	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.
10 Bascovy	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, small stones.	Severe: erodes easily.
11*:				
Bascovy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Sunburst	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12 Benz	Moderate: excess salt.	Moderate: excess salt.	Moderate: slope, excess salt.	Severe: erodes easily.
13 Bowbells	Slight	Slight	Slight	Slight.
14 Bryant	Slight	Slight	Moderate: slope.	Slight.
15 Bryant	Slight	Slight	Severe: slope.	Slight.
16*:				
Bryant	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
16*:				
Cambert	Slight	Slight	Moderate: slope.	Severe: erodes easily.
17 Bryant Variant	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Severe: erodes easily.
18 Busby	Slight	Slight	Moderate: slope.	Slight.
19 Busby	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
20*:				
Busby	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Fleak	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
21*:				
Busby	Slight	Slight	Moderate: slope.	Slight.
Twilight	Slight	Slight	Moderate: slope.	Slight.
22*:				
Busby	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Twilight	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Fleak	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
23*:				
Busby	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Yamac	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Fleak	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
24*:				
Busby	Slight	Slight	Moderate: slope.	Slight.
Yetull	Slight	Slight	Moderate: slope.	Slight.
25 Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
26*:				
Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Badland.				

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
27*:				
Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Barkof	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
28*:				
Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Brandenburg	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
29*:				
Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Dast	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
30*:				
Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Wabek	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Dast	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
31 Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
32*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Badland.				
33*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Kirby	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
34*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Twilight	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
35*:				
Cabbart	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
35*:				
Yawdim	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
36*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
37 Cambert	Slight	Slight	Moderate: slope.	Severe: erodes easily.
38*:				
Cambert	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Barkof	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
Cabba	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
39*:				
Cambert	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Cabba	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
40*:				
Cambert	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Dast	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Cabba	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
41 Cambeth	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
42*:				
Cambeth	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
Cabbart	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
43*:				
Cambeth	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
Twilight	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
43*:				
Cabbart	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
44 Cherry	Slight	Slight	Moderate: slope.	Severe: erodes easily.
45*:				
Cherry	Slight	Slight	Slight	Severe: erodes easily.
Havrelon	Severe: flooding.	Slight	Moderate: flooding.	Slight.
Trembles	Severe: flooding.	Slight	Moderate: flooding.	Slight.
46 Chinook	Slight	Slight	Moderate: slope.	Slight.
47 Chinook	Slight	Slight	Severe: slope.	Slight.
48 Chinook	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
49 Chinook	Slight	Slight	Moderate: slope.	Slight.
50 Creed	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
51*:				
Creed	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
52 Dast	Slight	Slight	Moderate: slope, small stones.	Slight.
53 Dast	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
54*:				
Dast	Slight	Slight	Moderate: slope, small stones.	Slight.
Blanchard	Slight	Slight	Moderate: slope.	Slight.
55*:				
Dast	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Blanchard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
56, 57 Dimmick	Severe: ponding, percs slowly, too clayey.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, percs slowly.	Severe: ponding, too clayey.
58 Ethridge	Slight	Slight	Moderate: slope.	Severe: erodes easily.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
59 Ethridge	Slight	Slight	Severe: slope.	Severe: erodes easily.
60 Evanston	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.
61 Evanston	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
62*:				
Evanston	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
63 Farland	Slight	Slight	Moderate: slope.	Severe: erodes easily.
64 Farnuf	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
65 Floweree	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
66 Floweree	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.
67*:				
Floweree	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
Cambeth	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
68 Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
69 Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Severe: erodes easily.
70*:				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Absher	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
71*:				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Yawdim	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: too clayey.
Fleak	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
72*:				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Severe: erodes easily.
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Fleak	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
73 Glendive	Severe: flooding.	Slight	Slight	Slight.
74 Glendive	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
75 Glendive	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
76 Glendive	Severe: flooding.	Slight	Slight	Slight.
77 Glendive	Slight	Slight	Slight	Slight.
78*:				
Glendive	Slight	Slight	Slight	Slight.
Hanly	Slight	Slight	Slight	Slight.
79 Hanly	Severe: flooding.	Slight	Moderate: flooding.	Slight.
80 Harlem	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey.	Slight.
81 Harlem	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Slight.
82 Havre	Severe: flooding.	Slight	Slight	Slight.
83 Havre	Slight	Slight	Slight	Severe: erodes easily.
84 Havre	Severe: flooding.	Slight	Slight	Slight.
85 Havre	Slight	Slight	Slight	Slight.
86 Havrelon	Severe: flooding.	Slight	Slight	Slight.
87 Havrelon	Slight	Slight	Slight	Slight.
88 Havrelon	Severe: flooding.	Slight	Moderate: flooding.	Severe: erodes easily.
89 Havrelon	Severe: flooding.	Slight	Slight	Slight.
90 Havrelon	Slight	Slight	Slight	Slight.
91 Hillon	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
92 Hillon	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
93 Hillon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
94*:				
Hillon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Badland.				
95*:				
Hillon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Yamac	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Fleak	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
96 Hoffmanville	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Slight.
97 Kremlin	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
98 Kremlin	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.
99 Lehr	Slight	Slight	Moderate: slope.	Slight.
100 Lisk	Slight	Slight	Moderate: slope.	Slight.
101 Lisk	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
102 Lohler	Slight	Slight	Slight	Slight.
103 Lohler	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
104 Lohler	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
105 Lonna	Slight	Slight	Moderate: slope.	Slight.
106*:				
Lonna	Slight	Slight	Slight	Slight.
Havre	Severe: flooding.	Moderate: dusty.	Moderate: flooding, dusty.	Severe: erodes easily.
Glendive	Severe: flooding.	Slight	Moderate: flooding.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
107: Macar	Slight	Slight	Moderate: slope.	Severe: erodes easily.
108: Macar	Slight	Slight	Severe: slope.	Severe: erodes easily.
109: Macar	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
110: Macar	Slight	Slight	Moderate: slope.	Severe: erodes easily.
111*:				
Macar	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Cabba	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
112*:				
Macar	Slight	Slight	Moderate: slope.	Severe: erodes easily.
Cambert	Slight	Slight	Moderate: slope.	Severe: erodes easily.
113: Marias	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: too clayey, percs slowly.	Severe: erodes easily.
114: Marvan	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey, percs slowly.	Severe: erodes easily.
115*:				
Neldore	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Badland.				
Bascovy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
116*:				
Neldore	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Bascovy	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, small stones.	Severe: erodes easily.
117*:				
Neldore	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Yamac	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Badland.				
118: Pendroy	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: too clayey, percs slowly.	Severe: erodes easily.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
119 Ridgelawn	Severe: flooding.	Slight	Slight	Severe: erodes easily.
120, 121 Rominell	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
122*:				
Rominell	Severe: excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Severe: erodes easily.
Yamac	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
123 Savage	Slight	Slight	Moderate: slope.	Severe: erodes easily.
124 Shambo	Slight	Slight	Moderate: slope.	Slight.
125 Shambo	Slight	Slight	Severe: slope.	Slight.
126*:				
Shambo	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Cabba	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
127*:				
Shambo	Slight	Slight	Moderate: slope.	Slight.
Cambert	Slight	Slight	Moderate: slope.	Severe: erodes easily.
128 Sunburst	Slight	Slight	Moderate: slope, small stones.	Slight.
129 Sunburst	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
130 Sunburst	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
131 Tally	Slight	Slight	Moderate: slope, small stones.	Slight.
132 Tally	Slight	Slight	Severe: slope.	Slight.
133 Telstad	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
134*:				
Telstad	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
134*:				
Hillon	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.
135*:				
Telstad	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Hillon	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
136*:				
Telstad	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
Thoeny	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
137 Thoeny	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
138*:				
Thoeny	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Absher	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
139 Trembles	Severe: flooding.	Slight	Slight	Slight.
140 Trembles	Slight	Slight	Slight	Slight.
141 Turner	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
142*:				
Twilight	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Yetull	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
143, 144. Typic Fluvaquents				
145. Typic Ustifluvents				
146*: Typic Ustorthents.				
Typic Ustifluvents.				
147*: Ustic Torriorthents.				
Ustic Torrifluvents.				
148 Vanda	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Severe: erodes easily.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
149 Vida	Slight	Slight	Moderate: small stones.	Slight.
150 Vida	Slight	Slight	Moderate: slope, small stones.	Slight.
151*:				
Vida	Slight	Slight	Moderate: slope, small stones.	Slight.
Zahill	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
152*:				
Vida	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Zahill	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
153 Wabek	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
154 Wabek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
155 Weingart	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
156 Williams	Slight	Slight	Slight	Slight.
157 Williams	Slight	Slight	Moderate: slope.	Slight.
158*:				
Williams	Slight	Slight	Moderate: slope.	Slight.
Vida	Slight	Slight	Moderate: slope, small stones.	Slight.
159 Yamac	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.
160 Yamac	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.
161 Yamac	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
162*:				
Yamac	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.
Twilight	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
163*:				
Yamac	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
Twilight	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Fleak	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
164 Yawdim	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: too clayey.
165*:				
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Badland.				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
166*:				
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Badland.				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Severe: erodes easily.
167*:				
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey, slope.
Kirby	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
168 Zahill	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
169 Zahill	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
170 Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
171*:				
Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Badland.				
172*:				
Zahill	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
172*:				
Cabba	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
173*:				
Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
174*:				
Zahill	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Yawdim	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
175*:				
Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1 Absher	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.
2 Adger	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, excess sodium.
3*:						
Adger	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, excess sodium.
Absher	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.
4. Aeric Fluvaquents						
5 Alona	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
6 Alona	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Moderate: excess salt.
7. Badland						
8 Banks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: droughty.
9 Barkof	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
10 Bascovy	Moderate: too clayey.	Severe: shrink-swell.	Severe: slippage, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
11*:						
Bascovy	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, low strength, slope.	Severe: slope, too clayey.
Sunburst	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
12 Benz	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: excess salt, droughty.
13 Bowbells	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
14 Bryant	Slight	Slight	Slight	Slight	Moderate: low strength, frost action.	Slight.
15 Bryant	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
16*:						
Bryant	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
Cambert	Slight	Moderate: slope, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: thin layer.
17 Bryant Variant	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength, frost action.	Severe: excess salt.
18 Busby	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
19 Busby	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
20*:						
Busby	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fleak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
21*:						
Busby	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Twilight	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty, thin layer.
22*:						
Busby	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Twilight	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, thin layer.
Fleak	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: thin layer.
23*:						
Busby	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Yamac	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fleak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
24*:						
Busby	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Yetull	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
25 Cabba	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
26*:						
Cabba	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Badland.						
27*:						
Cabba	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Barkof	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, low strength, slope.	Severe: slope, too clayey.
28*:						
Cabba	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Brandenburg	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, slope.
29*:						
Cabba	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Dast	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
30*:						
Cabba	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Wabek	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dast	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
31 Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
32*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Badland.						
33*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Kirby	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
34*:						
Cabbart----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Twilight---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
35*:						
Cabbart----------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Severe: thin layer.
Yawdim-----------	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, shrink-swell, slippage.	Severe: thin layer, too clayey.
36*:						
Cabbart----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Yawdim-----------	Severe: slippage, slope.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope, thin layer, too clayey.
37---------------- Cambert	Slight---------	Moderate: slope, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: thin layer.
38*:						
Cambert----------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope, thin layer.
Barkof-----------	Severe: slippage.	Severe: slippage, shrink-swell.	Severe: slippage, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, low strength, shrink-swell.	Severe: too clayey.
Cabba------------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Severe: thin layer.
39*:						
Cambert----------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope, thin layer.
Cabba------------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Severe: thin layer.
40*:						
Cambert----------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope, thin layer.
Dast-------------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
40*:						
Cabba	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Severe: thin layer.
41 Cambeth	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
42*:						
Cambeth	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
Cabbart	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Severe: thin layer.
43*:						
Cambeth	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
Twilight	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, thin layer.
Cabbart	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Severe: thin layer.
44 Cherry	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
45*:						
Cherry	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Havrelon	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Trembles	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
46 Chinook	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
47 Chinook	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
48 Chinook	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
49 Chinook	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
50 Creed	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.
51*:						
Creed	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1*:						
Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.
2 Dast	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: thin layer.
3 Dast	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
4*:						
Dast	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: thin layer.
Blanchard	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
5*:						
Dast	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Blanchard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
56, 57 Dimmick	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding, too clayey.
58, 59 Ethridge	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
60 Evanston	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.
61 Evanston	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
62*:						
Evanston	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Excess sodium.
63 Farland	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
64 Farnuf	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action, shrink-swell.	Slight.
65 Floweree	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
66 Floweree	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
67*:						
Floweree	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Cambeth	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
68 Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Excess sodium.
69 Gerdrum	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Excess sodium.
70*:						
Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Excess sodium.
Absher	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.
71*:						
Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Excess sodium.
Yawdim	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slippage.	Severe: low strength, shrink-swell, slippage.	Severe: thin layer, too clayey.
Fleak	Slight	Slight	Slight	Moderate: slope.	Slight	Severe: thin layer.
72*:						
Gerdrum	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Excess sodium.
Yawdim	Severe: slippage, slope.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope, thin layer, too clayey.
Fleak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
73, 74 Glendive	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
75 Glendive	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
76 Glendive	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
77 Glendive	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
78*:						
Glendive	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
78*:						
Hanly	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
79 Hanly	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
80 Harlem	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
81 Harlem	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
82 Havre	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
83 Havre	Slight	Slight	Slight	Slight	Slight	Slight.
84 Havre	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
85 Havre	Slight	Slight	Slight	Slight	Slight	Slight.
86 Havrelon	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
87 Havrelon	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
88 Havrelon	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
89 Havrelon	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
90 Havrelon	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
91 Hillon	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
92 Hillon	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
93 Hillon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
94*:						
Hillon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Badland.						
95*:						
Hillon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Yamac	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
95*:						
Fleak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
96 Hoffmanville	Severe: cutbanks cave.	Severe: shrink-swell.	Slight	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
97 Kremlin	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight.
98 Kremlin	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight.
99 Lehr	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
100 Lisk	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
101 Lisk	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
102 Lohler	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
103 Lohler	Moderate: too clayey, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
104 Lohler	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
105 Lonna	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
106*:						
Lonna	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Havre	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Glendive	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
107 Macar	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.
108 Macar	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
109 Macar	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
110 Macar	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action, shrink-swell.	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
111*:						
Macar	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Cabba	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Severe: thin layer.
112*:						
Macar	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
Cambert	Slight	Moderate: slope, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: thin layer.
113 Marias	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
114 Marvan	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
115*:						
Neldore	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, depth to rock, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, low strength, slope.	Severe: slope, thin layer, too clayey.
Badland.						
Bascovy	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, low strength, slope.	Severe: slope, too clayey.
116*:						
Neldore	Severe: slippage.	Severe: slippage, shrink-swell.	Severe: slippage, depth to rock, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, low strength, shrink-swell.	Severe: thin layer, too clayey.
Bascovy	Moderate: too clayey.	Severe: shrink-swell.	Severe: slippage, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
117*:						
Neldore	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, depth to rock, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, low strength, slope.	Severe: slope, thin layer, too clayey.
Yamac	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Badland.						
118 Pendroy	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
119 Ridgelawn	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
120, 121 Rominell	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Severe: excess sodium.
122*:						
Rominell	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Severe: excess sodium.
Yamac	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: slope.
123 Savage	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
124 Shambo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.
125 Shambo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
126*:						
Shambo	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Cabba	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Severe: thin layer.
127*:						
Shambo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
Cambert	Slight	Moderate: slope, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: thin layer.
128 Sunburst	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
129 Sunburst	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
130 Sunburst	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
131 Tally	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
132 Tally	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
133 Telstad	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength.	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
34*						
Telstad	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength.	Slight.
Hillon	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
35*:						
Telstad	Moderate: shrink-swell,	Moderate: slope, shrink-swell.	Moderate: slope.	Severe: low strength, slope.	Moderate:	Slight.
Hillon	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
36*						
Telstad	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength.	Slight.
Thoeny	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Severe: excess sodium.
37 Thoeny	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Severe: excess sodium.
38*						
Thoeny	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate; shrink-swell, slope.	Severe: low strength.	Severe: excess sodium.
Absher	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.
39 Trembles	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
40 Trembles	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
41 Turner	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell. frost action.	Moderate: low strength,	Moderate: droughty.
142*:						
Twilight	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, thin layer.
Yetull	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
143, 144. Typic Fluvaquents						
145. Typic Ustifluvents						

See footnotes at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
146*:						
Typic Ustorthents.						
Typic Ustifluvents.						
147*:						
Ustic Torriorthents.						
Ustic Torrifluvents.						
148 Vanda	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, too clayey.
149 Vida	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Moderate: large stones.
150 Vida	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: large stones.
151*:						
Vida	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: large stones.
Zahill	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: large stones.
152*:						
Vida	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: large stones, slope.
Zahill	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: large stones, slope.
153 Wabek	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
154 Wabek	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
155 Weingart	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium, too clayey.
156, 157 Williams	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
158*:						
Williams	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Vida	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Moderate: large stones.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
159 Yamac	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
160 Yamac	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
161 Yamac	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: slope.
162*:						
Yamac	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
Twilight	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty, thin layer.
163*:						
Yamac	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: slope.
Twilight	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, thin layer.
Fleak	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: thin layer.
164 Yawdim	Slight	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: thin layer, too clayey.
165*:						
Yawdim	Severe: slippage, slope.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope, thin layer, too clayey.
Badland.						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
166*:						
Yawdim	Severe: slippage, slope.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope, thin layer, too clayey.
Badland.						
Gerdrum	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Excess sodium.
167*:						
Yawdim	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, thin layer, too clayey.
Kirby	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
168 Zahill	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: large stones.
169 Zahill	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: large stones, slope.
170 Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
171*:						
Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Badland.						
172*:						
Zahill	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: large stones, slope.
Cabba	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Severe: thin layer.
173*:						
Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cabba	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
174*:						
Zahill	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: large stones, slope.
Yawdim	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, shrink-swell, slippage.	Severe: thin layer, too clayey.
175*:						
Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Yawdim	Severe: slippage, slope.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope, thin layer, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 Absher	Severe: percs slowly.	Severe: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
2 Adger	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium, excess salt.	Slight	Poor: too clayey, hard to pack, excess salt.
3*:					
Adger	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium, excess salt.	Slight	Poor: too clayey, hard to pack, excess salt.
Absher	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
4. Aeric fluvaquents					
5 Alona	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Good.
6 Alona	Severe: percs slowly.	Severe: flooding.	Severe: excess salt.	Moderate: flooding.	Good.
7. Badland					
8 Banks	Severe: poor filter.	Severe: seepage, flooding.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
9 Barkof	Severe: depth to rock, percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Severe: seepage.	Poor: area reclaim, too clayey, hard to pack.
10 Bascovy	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: area reclaim, hard to pack.
11*:					
Bascovy	Severe: slippage, depth to rock.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage.	Poor: area reclaim, hard to pack, slope.
Sunburst	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
12 Benz	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Good.
13 Bowbells	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
14, 15 Bryant	Slight	Moderate: slope, seepage.	Slight	Slight	Good.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
16*:					
Bryant	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
Cambert	Severe: percs slowly, slope.	Moderate: seepage, slope.	Slight	Slight	Poor: area reclaim.
17 Bryant Variant	Moderate: wetness, percs slowly.	Moderate: seepage, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
18 Busby	Slight	Severe: seepage.	Slight	Slight	Good.
19 Busby	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
20*:					
Busby	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Fleak	Severe: slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: area reclaim, too sandy, slope.
21*:					
Busby	Slight	Severe: seepage.	Slight	Slight	Good.
Twilight	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim.
22*:					
Busby	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Twilight	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Fleak	Moderate: slope.	Severe: seepage, slope.	Severe: too sandy.	Moderate: slope.	Poor: area reclaim, too sandy.
23*:					
Busby	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Yamac	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Fleak	Severe: slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: area reclaim, too sandy, slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--*Continued*

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
24*:					
Busby	Slight	Severe: seepage.	Slight	Slight	Good.
Yetull	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: seepage, too sandy.
25 Cabba	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
26*:					
Cabba	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Badland.					
27*:					
Cabba	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Barkof	Severe: slippage, depth to rock, slope.	Severe: slippage, seepage, slope.	Severe: slippage, seepage, slope.	Severe: slippage, seepage, slope.	Poor: area reclaim, too clayey, hard to pack.
28*:					
Cabba	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Brandenburg	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
29*:					
Cabba	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Dast	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: area reclaim, slope.
30*:					
Cabba	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Wabek	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, seepage, small stones.
Dast	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
31-------------------Cabbart	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
32*:					
Cabbart------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Badland.					
33*:					
Cabbart------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Kirby--------------	Severe: slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: seepage, small stones, slope.
34*:					
Cabbart------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Twilight-----------	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
35*:					
Cabbart------------	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Yawdim-------------	Severe: depth to rock, slippage, percs slowly.	Severe: slippage, seepage, slope.	Severe: slippage.	Severe: slippage.	Poor: area reclaim, hard to pack.
36*:					
Cabbart------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Yawdim-------------	Severe: depth to rock, slope, slippage.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: area reclaim, hard to pack, slope.
37-------------------Cambert	Severe: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Poor: area reclaim.
38*:					
Cambert------------	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
38*:					
Barkof	Severe: slippage, depth to rock, percs slowly.	Severe: slippage, seepage, slope.	Severe: slippage, seepage, too clayey.	Severe: slippage, seepage.	Poor: area reclaim, too clayey, hard to pack.
Cabba	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
39*:					
Cambert	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Cabba	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
40*:					
Cambert	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Dast	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: area reclaim.
Cabba	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
41 Cambeth	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: area reclaim.
42*:					
Cambeth	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Cabbart	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
43*:					
Cambeth	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Twilight	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Cabbart	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
44 Cherry	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
45*:					
Cherry	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Havrelon	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Trembles	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
46, 47 Chinook	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
48 Chinook	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
49 Chinook	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
50 Creed	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
51*:					
Creed	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack:
Gerdrum	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
52 Dast	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: area reclaim.
53 Dast	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: area reclaim.
54*:					
Dast	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: area reclaim.
Blanchard	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
55*:					
Dast	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: area reclaim, slope.
Blanchard	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope.
56, 57 Dimmick	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
58, 59 Ethridge	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
60 Evanston	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
61----------------- Evanston	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
62*:					
Evanston-----------	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
Gerdrum------------	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Poor: hard to pack.
63----------------- Farland	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
64----------------- Farnuf	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey, small stones.
65, 66------------- Floweree	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
67*:					
Floweree-----------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
Cambeth------------	Severe: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Poor: area reclaim.
68----------------- Gerdrum	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Poor: hard to pack.
69----------------- Gerdrum	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: hard to pack.
70*:					
Gerdrum------------	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Poor: hard to pack.
Absher-------------	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight-----------	Poor: hard to pack.
71*:					
Gerdrum------------	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Poor: hard to pack.
Yawdim-------------	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight-----------	Slight-----------	Poor: area reclaim, hard to pack.
Fleak--------------	Slight-----------	Severe: seepage.	Severe: too sandy.	Slight-----------	Poor: area reclaim, too sandy.
72*:					
Gerdrum------------	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: hard to pack.
Yawdim-------------	Severe: depth to rock, slope, slippage.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: area reclaim, hard to pack, slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
72*:					
Fleak	Severe: slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: area reclaim, too sandy, slope.
73, 74 Glendive	Moderate: flooding.	Severe: seepage, flooding.	Moderate: flooding, too sandy.	Moderate: flooding.	Fair: too sandy.
75 Glendive	Slight	Severe: seepage.	Moderate: too sandy.	Slight	Fair: too sandy.
76 Glendive	Moderate: flooding.	Severe: seepage, flooding.	Moderate: flooding, too sandy.	Moderate: flooding.	Fair: too sandy.
77 Glendive	Slight	Severe: seepage.	Moderate: too sandy.	Slight	Fair: too sandy.
78*:					
Glendive	Slight	Severe: seepage.	Moderate: too sandy.	Slight	Fair: too sandy.
Hanly	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: seepage, too sandy.
79 Hanly	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, too sandy.	Severe: flooding.	Poor: seepage, too sandy.
80 Harlem	Severe: percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Poor: hard to pack.
81 Harlem	Severe: percs slowly.	Slight	Slight	Slight	Poor: hard to pack.
82 Havre	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good:
83 Havre	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
84 Havre	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good.
85 Havre	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
86 Havrelon	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
87 Havrelon	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
88 Havrelon	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
89 Havrelon	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
90 Havrelon	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
91 Hillon	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
92 Hillon	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
93 Hillon	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
94*: Hillon	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Badland.					
95*: Hillon	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Yamac	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Fleak	Severe: slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope,	Poor: area reclaim, too sandy, slope.
96 Hoffmanville	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
97, 98 Kremlin	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
99 Lehr	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
100 Lisk	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
101 Lisk	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
102 Lohler	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack
103 Lohler	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too claye[illegible] hard t[illegible]ck.
104 Lohler	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	[illegible] too clayey, hard to pack.
105 Lonna	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
106*:					
Lonna	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Havre	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Glendive	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding.	Severe: flooding.	Fair: too sandy.
107, 108 Macar	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
109 Macar	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
110 Macar	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
111*:					
Macar	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Cabba	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
112*:					
Macar	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Cambert	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: area reclaim.
113 Marias	Severe: percs slowly.	Slight	Slight	Slight	Poor: hard to pack.
114 Marvan	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
115*:					
Neldore	Severe: slippage, depth to rock, slope.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: area reclaim, hard to pack, slope.
Badland.					
Bascovy	Severe: slippage, depth to rock.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage.	Poor: area reclaim, hard to pack, slope.
116*:					
Neldore	Severe: slippage, depth to rock, percs slowly.	Severe: slippage, seepage, slope.	Severe: slippage.	Severe: slippage.	Poor: area reclaim, hard to pack.
Bascovy	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: area reclaim, hard to pack.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
117*:					
Neldore	Severe: slippage, depth to rock, slope.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: area reclaim, hard to pack, slope.
Yamac	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Badland.					
118 Pendroy	Severe: percs slowly.	Slight	Slight	Slight	Poor: hard to pack.
119 Ridgelawn	Severe: poor filter.	Severe: seepage, flooding.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
120, 121 Rominell	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
122*:					
Rominell	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Yamac	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
123 Savage	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
124, 125 Shambo	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
126*:					
Shambo	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Cabba	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
127*:					
Shambo	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Cambert	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: area reclaim.
128 Sunburst	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
129 Sunburst	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
130 Sunburst	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
131, 132 Tally	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
133----------------- Telstad	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
134*:					
Telstad------------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
Hillon-------------	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Good.
135*:					
Telstad------------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Hillon-------------	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
136*:					
Telstad------------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
Thoeny-------------	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Good.
137----------------- Thoeny	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Good.
138*:					
Thoeny-------------	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Good.
Absher-------------	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight-----------	Poor: hard to pack.
139----------------- Trembles	Moderate: flooding.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
140----------------- Trembles	Slight-----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
141----------------- Turner	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
142*:					
Twilight-----------	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Yetull-------------	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy.	Moderate: slope.	Poor: seepage, too sandy.
143, 144. Typic Fluvaquents					
145. Typic Ustifluvents					
146*: Typic Ustorthents.					
Typic Ustifluvents.					
147*: Ustic Torriorthents.					

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
147*: Ustic Torrifluvents.					
148----------------- Vanda	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Poor: hard to pack.
149----------------- Vida	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
150----------------- Vida	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
151*: Vida---------------	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
Zahill-------------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
152*: Vida---------------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Zahill-------------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
153----------------- Wabek	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy, seepage.	Severe: seepage.	Poor: too sandy, seepage, small stones.
154----------------- Wabek	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, seepage, small stones.
155----------------- Weingart	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight-----------	Slight-----------	Poor: area reclaim, hard to pack.
156----------------- Williams	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
157----------------- Williams	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
158*: Williams-----------	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
Vida---------------	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
159, 160------------ Yamac	Moderate: percs slowly.	Severe: seepage.	Slight-----------	Slight-----------	Good.
161----------------- Yamac	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
162*:					
Yamac	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Twilight	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim.
163*:					
Yamac	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Twilight	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
Fleak	Moderate: slope.	Severe: seepage, slope.	Severe: too sandy.	Moderate: slope.	Poor: area reclaim, too sandy.
164 Yawdim	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: area reclaim, hard to pack.
165*:					
Yawdim	Severe: depth to rock, slope, slippage.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: area reclaim, hard to pack, slope.
Badland.					
Cabbart	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
166*:					
Yawdim	Severe: depth to rock, slope, slippage.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: area reclaim, hard to pack, slope.
Badland.					
Gerdrum	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: hard to pack.
167*:					
Yawdim	Severe: depth to rock, slope, slippage.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: area reclaim, hard to pack, slope.
Kirby	Severe: slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: seepage, small stones, slope.
168 Zahill	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
169 Zahill	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
170------------------- Zahill	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
171*:					
Zahill---------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Badland.					
172*:					
Zahill---------------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Cabba----------------	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: area reclaim.
173*:					
Zahill---------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cabba----------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
174*:					
Zahill---------------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Yawdim---------------	Severe: depth to rock, slippage, percs slowly.	Severe: slippage, seepage, slope.	Severe: slippage.	Severe: slippage.	Poor: area reclaim, hard to pack.
175*:					
Zahill---------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Yawdim---------------	Severe: depth to rock, slope, slippage.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: area reclaim, hard to pack, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1--------------------- Absher	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
2--------------------- Adger	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
3*:				
Adger----------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Absher---------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
4. Aeric Fluvaquents				
5, 6------------------ Alona	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
7. Badland				
8--------------------- Banks	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
9--------------------- Barkof	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
10-------------------- Bascovy	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
11*:				
Bascovy--------------	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Sunburst-------------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
12-------------------- Benz	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
13-------------------- Bowbells	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
14, 15---------------- Bryant	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
16*:				
Bryant---------------	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
16*:				
Cambert	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
17 Bryant Variant	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
18 Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
19 Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
20*:				
Busby	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Fleak	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
21*:				
Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Twilight	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
22*:				
Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Twilight	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
Fleak	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
23*:				
Busby	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Yamac	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Fleak	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
24*:				
Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Yetull	Good	Probable	Improbable: too sandy.	Fair: too sandy.
25 Cabba	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
26*:				
Cabba	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, slope.
Badland.				
27*:				
Cabba	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, slope.
Barkof	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
28*:				
Cabba	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, slope.
Brandenburg	Poor: large stones, slope.	Improbable: small stones, large stones.	Improbable: large stones.	Poor: small stones, area reclaim, slope.
29*:				
Cabba	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, slope.
Dast	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
30*:				
Cabba	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, slope.
Wabek	Fair: slope.	Probable	Probable	Poor: small stones, slope, area reclaim.
Dast	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
31 Cabbart	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
32*:				
Cabbart	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Badland.				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
33*:				
Cabbart	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Kirby	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, area reclaim, slope.
34*:				
Cabbart	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Twilight	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
35*:				
Cabbart	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Yawdim	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.
36*:				
Cabbart	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Yawdim	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.
37 Cambert	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
38*:				
Cambert	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
Barkof	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Cabba	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer.
39*:				
Cambert	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
Cabba	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
40*:				
Cambert	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
Dast	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
Cabba	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer.
41 Cambeth	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
42*:				
Cambeth	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
Cabbart	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
43*:				
Cambeth	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
Twilight	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
Cabbart	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
44 Cherry	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
45*:				
Cherry	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Havrelon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Trembles	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
46, 47 Chinook	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
48 Chinook	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
49 Chinook	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
50 Creed	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
51*:				
Creed	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess fines.
Gerdrum	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
52 Dast	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
53 Dast	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
54*:				
Dast	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
Blanchard	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
55*:				
Dast	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Blanchard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
56, 57 Dimmick	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
58, 59 Ethridge	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
60, 61 Evanston	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones.
62*:				
Evanston	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones.
Gerdrum	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
63 Farland	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
64 Farnuf	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
65, 66 Floweree	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
67*:				
Floweree	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
67*:				
Cambeth	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
68, 69 Gerdrum	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
70*:				
Gerdrum	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Absher	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
71*:				
Gerdrum	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Yawdim	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.
Fleak	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
72*:				
Gerdrum	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Yawdim	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.
Fleak	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
73, 74, 75, 76 Glendive	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
77 Glendive	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
78*:				
Glendive	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Hanly	Good	Probable	Improbable: too sandy.	Poor: thin layer.
79 Hanly	Good	Probable	Improbable: too sandy.	Poor: thin layer.
80, 81 Harlem	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
82, 83 Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
84, 85 Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
86, 87 Havrelon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
88 Havrelon	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
89, 90 Havrelon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
91 Hillon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
92 Hillon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
93 Hillon	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
94*:				
Hillon	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Badland.				
95*:				
Hillon	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Yamac	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Fleak	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
96 Hoffmanville	Good	Probable	Probable	Poor: too clayey.
97, 98 Kremlin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
99 Lehr	Good	Probable	Probable	Poor: small stones, area reclaim.
100 Lisk	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
101 Lisk	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
102,103, 104 Lohler	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
105: Lonna	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
106*:				
Lonna	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Glendive	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
107, 108: Macar	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
109: Macar	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
110: Macar	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
111*:				
Macar	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Cabba	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer.
112*:				
Macar	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Cambert	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
113: Marias	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
114: Marvan	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
115*:				
Neldore	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.
Badland.				
Bascovy	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
116*:				
Neldore	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
116*:				
Bascovy	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
117*:				
Neldore	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.
Yamac	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Badland.				
118 Pendroy	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
119 Ridgelawn	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
120, 121 Rominell	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
122*:				
Rominell	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
123 Savage	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
124, 125 Shambo	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
126*:				
Shambo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Cabba	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer.
127*:				
Shambo	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Cambert	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
128 Sunburst	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
129 Sunburst	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
130: Sunburst	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
131, 132: Tally	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
133: Telstad	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
134*:				
Telstad	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Hillon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
135*:				
Telstad	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Hillon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
136*:				
Telstad	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Thoeny	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
137: Thoeny	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
138*:				
Thoeny	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Absher	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
139, 140: Trembles	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
141: Turner	Good	Probable	Probable	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
142*:				
Twilight	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
Yetull	Good	Probable	Improbable: too sandy.	Fair: too sandy.
143, 144. Typic Fluvaquents				
145. Typic Ustifluvents				
146*: Typic Ustorthents.				
Typic Ustifluvents.				
147*: Ustic Torriorthents.				
Ustic Torrifluvents.				
148 Vanda	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
149, 150 Vida	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
151*:				
Vida	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Zahill	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones.
152*:				
Vida	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Zahill	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones, slope.
153 Wabek	Good	Probable	Probable	Poor: small stones, area reclaim.
154 Wabek	Poor: slope.	Probable	Probable	Poor: small stones, slope, area reclaim.
155 Weingart	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
156, 157: Williams	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones.
158*:				
Williams	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones.
Vida	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
159, 160: Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
161: Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
162*:				
Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Twilight	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
163*:				
Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Twilight	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
Fleak	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
164: Yawdim	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.
165*:				
Yawdim	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.
Badland.				
Cabbart	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
166*:				
Yawdim	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.
Badland.				
Gerdrum	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
167*:				
Yawdim	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.
Kirby	Fair: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, area reclaim, slope.
168 Zahill	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones.
169 Zahill	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones, slope.
170 Zahill	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
171*:				
Zahill	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Badland.				
172*:				
Zahill	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones, slope.
Cabba	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer.
173*:				
Zahill	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cabba	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, slope.
174*:				
Zahill	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones, slope.
Yawdim	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.
175*:				
Zahill	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Yawdim	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
1: Absher	Severe: slope.	Severe: excess sodium, excess salt.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
2: Adger	Moderate: slope.	Severe: excess sodium, excess salt.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
3*:						
Adger	Moderate: slope.	Severe: excess sodium, excess salt.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
Absher	Moderate: slope.	Severe: excess sodium, excess salt.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
4. Aeric Fluvaquents						
5: Alona	Moderate: slope.	Severe: piping, excess salt.	Deep to water	Slope, erodes easily, excess salt.	Erodes easily.	Erodes easily.
6: Alona	Slight	Severe: piping, excess salt.	Deep to water	Erodes easily, excess salt.	Erodes easily.	Excess salt, erodes easily.
7. Badland						
8: Banks	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
9: Barkof	Severe: seepage.	Severe: hard to pack, thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, percs slowly.	Depth to rock, percs slowly.
10: Bascovy	Severe: seepage.	Severe: hard to pack, thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
11*:						
Bascovy	Severe: slippage, seepage, slope.	Severe: hard to pack, thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Sunburst	Severe: slope.	Slight	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
12: Benz	Moderate: slope.	Severe: excess salt.	Deep to water	Droughty, percs slowly, slope.	Erodes easily, percs slowly.	Excess salt, erodes easily.
13: Bowbells	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily.	Erodes easily.
14: Bryant	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily.	Erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
15 Bryant	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily.	Erodes easily.
16*:						
Bryant	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily.	Erodes easily.
Cambert	Moderate: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
17 Bryant Variant	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, excess salt.	Erodes easily.	Excess salt, erodes easily.
18 Busby	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
19 Busby	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, erodes easily, soil blowing.	Slope, erodes easily.
20*:						
Busby	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, erodes easily, soil blowing.	Slope, erodes easily.
Fleak	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
21*:						
Busby	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
Twilight	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing, depth to rock.	Depth to rock, soil blowing.	Droughty, depth to rock.
22*:						
Busby	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, erodes easily, soil blowing.	Slope, erodes easily.
Twilight	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Fleak	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
23*:						
Busby	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, erodes easily, soil blowing.	Slope, erodes easily.
Yamac	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Fleak	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
24*:						
Busby	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
24*:						
Yetull	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
25 Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
26*:						
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Badland.						
27*:						
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Barkof	Severe: slippage, seepage, slope.	Severe: hard to pack, thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
28*:						
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Brandenburg	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
29*:						
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Dast	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock. slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
30*:						
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Wabek	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing, slope.	Too sandy, soil blowing, slope.	Slope, droughty.
Dast	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
31 Cabbart	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
32*:						
Cabbart	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Badland.						

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
33*:						
Cabbart	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Kirby	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
34*:						
Cabbart	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Twilight	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
35*, 36*:						
Cabbart	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
37 Cambert	Moderate: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily,	Depth to rock, erodes easily.	Erodes easily, depth to rock.
38*:						
Cambert	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily,	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Barkof	Severe: slippage, seepage, slope.	Severe: hard to pack, thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
39*:						
Cambert	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily,	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
40*:						
Cambert	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily,	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Dast	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
41 Cambeth	Moderate: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
42*:						
Cambeth	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Cabbart	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
43*:						
Cambeth	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Twilight	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Cabbart	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
44 Cherry	Slight	Moderate: piping, hard to pack.	Deep to water	Favorable	Erodes easily.	Erodes easily.
45*:						
Cherry	Slight	Moderate: piping, hard to pack.	Deep to water	Favorable	Erodes easily.	Erodes easily.
Havrelon	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
Trembles	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, flooding.	Soil blowing.	Favorable.
46 Chinook	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing.	Soil blowing.	Favorable.
47 Chinook	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing.	Favorable.
48 Chinook	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
49 Chinook	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing.	Favorable.
50 Creed	Moderate: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
51*:						
Creed	Moderate: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Gerdrum	Moderate: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
52 Dast	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, soil blowing.	Depth to rock.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
53----------------- Dast	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
54*:						
Dast-------------	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, soil blowing.	Depth to rock.
Blanchard---------	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
55*:						
Dast-------------	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Blanchard---------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
56, 57------------ Dimmick	Slight----------	Severe: hard to pack, ponding.	Ponding, percs slowly.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
58----------------- Ethridge	Slight----------	Moderate: piping.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
59----------------- Ethridge	Moderate: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
60----------------- Evanston	Moderate: seepage.	Moderate: piping.	Deep to water	Erodes easily.	Erodes easily.	Erodes easily.
61----------------- Evanston	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
62*:						
Evanston----------	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
Gerdrum-----------	Moderate: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
63----------------- Farland	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily.	Erodes easily.	Erodes easily.
64----------------- Farnuf	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily.	Erodes easily.	Erodes easily.
65----------------- Floweree	Slight----------	Severe: piping.	Deep to water	Erodes easily.	Erodes easily.	Erodes easily.
66----------------- Floweree	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
67*:						
Floweree----------	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
Cambeth-----------	Moderate: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
68 Gerdrum	Moderate: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
69 Gerdrum	Severe: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Slope, erodes easily, percs slowly.	Excess sodium, slope, erodes easily,
70*:						
Gerdrum	Moderate: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Absher	Moderate: slope.	Severe: excess sodium, excess salt.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
71*:						
Gerdrum	Slight	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Yawdim	Severe: seepage.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, percs slowly.	Depth to rock, percs slowly.
Fleak	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Depth to rock, too sandy.	Droughty, depth to rock.
72*:						
Gerdrum	Severe: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Slope, erodes easily, percs slowly.	Excess sodium, slope, erodes easily.
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
Fleak	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
73 Glendive	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Soil blowing.	Favorable.
74, 75, 76, 77 Glendive	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
78*:						
Glendive	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing.	Soil blowing.	Favorable.
Hanly	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
79 Hanly	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
80, 81 Harlem	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
82, 83 Havre	Moderate: seepage.	Severe: piping.	Deep to water	Excess salt	Erodes easily.	Erodes easily.
84, 85 Havre	Moderate: seepage.	Severe: piping.	Deep to water	Excess salt	Favorable	Favorable.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
86, 87 Havrelon	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
88 Havrelon	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding, excess salt.	Erodes easily.	Erodes easily.
89, 90 Havrelon	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
91 Hillon	Moderate: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
92, 93 Hillon	Severe: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
94*:						
Hillon	Severe: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Badland.						
95*:						
Hillon	Severe: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Yamac	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Fleak	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
96 Hoffmanville	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slow intake, percs slowly.	Too sandy	Percs slowly.
97 Kremlin	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily.	Erodes easily.	Erodes easily.
98 Kremlin	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
99 Lehr	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy	Droughty.
100 Lisk	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing.	Favorable.
101 Lisk	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
102 Lohler	Slight	Severe: hard to pack.	Deep to water	Percs slowly.	Percs slowly.	Percs slowly.
103, 104 Lohler	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Percs slowly.	Percs slowly.
105 Lonna	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily.	Erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
106*:						
Lonna	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily.	Erodes easily.
Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily.	Erodes easily.
Glendive	Severe: seepage.	Severe: piping.	Deep to water	Flooding, soil blowing.	Soil blowing.	Favorable.
107 Macar	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily.	Erodes easily.	Erodes easily.
108 Macar	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
109 Macar	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
110 Macar	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, excess salt.	Erodes easily.	Erodes easily.
111*:						
Macar	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
112*:						
Macar	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
Cambert	Moderate: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
113 Marias	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
114 Marvan	Moderate: slope.	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Erodes easily, percs slowly.	Excess salt, erodes easily, percs slowly.
115*:						
Neldore	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Badland.						
Bascovy	Severe: slippage, seepage, slope.	Severe: hard to pack, thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
116*:						
Neldore	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
116*:						
Bascovy	Severe: seepage.	Severe: hard to pack, thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
117*:						
Neldore	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Yamac	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Badland.						
118 Pendroy	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
119 Ridgelawn	Severe: seepage.	Severe: seepage, piping.	Deep to water	Erodes easily.	Erodes easily, too sandy.	Erodes easily.
120, 121 Rominell	Moderate: seepage, slope.	Severe: piping, excess sodium.	Deep to water	Percs slowly, slope, excess sodium.	Erodes easily.	Excess sodium, erodes easily, percs slowly.
122*:						
Rominell	Moderate: seepage, slope.	Severe: piping, excess sodium.	Deep to water	Percs slowly, slope, excess sodium.	Erodes easily.	Excess sodium, erodes easily, percs slowly.
Yamac	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
123 Savage	Slight	Moderate: piping.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
124 Shambo	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
125 Shambo	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
126*:						
Shambo	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
127*:						
Shambo	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
Cambert	Moderate: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
128 Sunburst	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.	Percs slowly.	Percs slowly.
129, 130 Sunburst	Severe: slope.	Slight	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
131--------------- Tally	Severe: seepage.	Severe: seepage, piping.	Deep to water	Soil blowing.	Soil blowing.	Favorable.
132--------------- Tally	Severe: seepage.	Severe: seepage, piping.	Deep to water	Soil blowing, slope.	Soil blowing.	Favorable.
133--------------- Telstad	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
134*:						
Telstad----------	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Hillon-----------	Moderate: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
135*:						
Telstad----------	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Hillon-----------	Severe: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
136*:						
Telstad----------	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Thoeny-----------	Moderate: slope.	Severe: excess sodium.	Deep to water	Percs slowly, slope, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
137--------------- Thoeny	Moderate: slope.	Severe: excess sodium.	Deep to water	Percs slowly, slope, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
138*:						
Thoeny-----------	Moderate: slope.	Severe: excess sodium.	Deep to water	Percs slowly, slope, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
Absher-----------	Moderate: slope.	Severe: excess sodium, excess salt.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
139, 140---------- Trembles	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing.	Too sandy, soil blowing.	Favorable.
141--------------- Turner	Severe: seepage.	Severe: seepage.	Deep to water	Droughty-------	Large stones, erodes easily.	Erodes easily, droughty.
142*:						
Twilight---------	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Yetull-----------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
143, 144. Typic Fluvaquents						
145. Typic Ustifluvents						
146*: Typic Ustorthents.						
Typic Ustifluvents.						
147*: Ustic Torriorthents.						
Ustic Torrifluvents.						
148 Vanda	Moderate: slope.	Severe: hard to pack.	Deep to water	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess salt, erodes easily.
149 Vida	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
150 Vida	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
151*: Vida	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
Zahill	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
152*: Vida	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope	Slope.
Zahill	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
153, 154 Wabek	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing, slope.	Too sandy, soil blowing, slope.	Slope, droughty.
155 Weingart	Severe: seepage.	Severe: excess sodium.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, erodes easily.	Excess sodium, erodes easily, depth to rock.
156 Williams	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily.	Erodes easily.
157 Williams	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope.	Erodes easily.	Erodes easily.
158*: Williams	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope.	Erodes easily.	Erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
158*:						
Vida	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
159 Yamac	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily.	Erodes easily.	Erodes easily.
160 Yamac	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
161 Yamac	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
162*:						
Yamac	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
Twilight	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing, depth to rock.	Depth to rock, soil blowing.	Droughty, depth to rock.
163*:						
Yamac	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Twilight	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Fleak	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
164 Yawdim	Severe: slippage, seepage.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, percs slowly.	Depth to rock, percs slowly.
165*:						
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
Badland.						
Cabbart	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
166*:						
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock. percs slowly.
Badland.						
Gerdrum	Severe: slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly, excess sodium.	Slope, erodes easily, percs slowly.	Excess sodium, slope, erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
167*:						
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
Kirby	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
168 Zahill	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.	Erodes easily.
169, 170 Zahill	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
171*:						
Zahill	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Badland.						
172*, 173*:						
Zahill	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Cabba	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
174*, 175*:						
Zahill	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--ENGINEERING INDEX PROPERTIES

[The symbol > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
1---------------- Absher	0-7	Clay loam--------	CL	A-6	0	95-100	75-100	70-100	60-90	25-40	10-20
	7-11	Silty clay, clay, clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-60	20-40
	11-60	Clay loam, clay, sandy clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-55	20-35
2---------------- Adger	0-7	Silty clay loam	CL	A-6, A-7	0-10	90-100	85-100	75-100	65-90	30-45	10-20
	7-16	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0-10	90-100	85-100	75-100	65-95	35-60	15-40
	16-60	Silty clay loam, gravelly clay loam, silt loam.	CL, CH	A-6, A-7	0-10	80-100	70-100	65-100	55-90	35-60	15-40
3*:											
Adger-----------	0-7	Silty clay loam	CL	A-6, A-7	0-10	90-100	85-100	75-100	65-90	30-45	10-20
	7-16	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0-10	90-100	85-100	75-100	65-95	35-60	15-40
	16-60	Silty clay loam, gravelly clay loam, silt loam.	CL, CH	A-6, A-7	0-10	80-100	70-100	65-100	55-90	35-60	15-40
Absher----------	0-7	Clay loam--------	CL	A-6	0	95-100	75-100	70-100	60-90	25-40	10-20
	7-11	Silty clay, clay, clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-60	20-40
	11-60	Clay loam, clay, sandy clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-55	20-35
4. Aeric Fluvaquents											
5---------------- Alona	0-5	Silt loam--------	CL-ML, ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	5-13	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-40	5-15
	13-22	Silty clay loam, silt loam.	CL-ML, SIL	A-4, A-6	---	100	100	95-100	80-95	25-40	5-15
	22-60	Silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-15
6---------------- Alona	0-5	Silt loam--------	CL-ML, ML	A-4	0	100	100	95-100	60-90	25-35	5-10
	5-22	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-95	25-40	5-15
	22-60	Silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-15
7. Badland											
8---------------- Banks	0-16	Fine sandy loam	ML, SM	A-4	0	100	100	75-90	45-75	20-25	NP-5
	16-60	Loamy fine sand, fine sand, sand.	SM, SP-SM	A-2	0	100	100	50-70	10-25	---	NP
9---------------- Barkof	0-7	Silty clay-------	CL, CH	A-7	0	100	100	90-100	85-95	45-60	20-30
	7-29	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-90	45-65	25-45
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
10--------------- Bascovy	0-2	Silty clay-------	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-11	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	11-23	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
11*:											
Bascovy----------	0-2	Silty clay-------	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-11	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	11-23	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sunburst---------	0-3	Clay loam--------	CL	A-6, A-7	0-10	95-100	85-95	85-95	75-85	35-45	15-20
	3-19	Clay, clay loam, silty clay loam.	CL	A-7	0-10	95-100	85-95	85-95	85-95	40-50	20-30
	19-60	Clay, clay loam, silty clay.	CL	A-7	0-10	95-100	85-95	85-95	85-95	40-50	20-30
12--------------- Benz	0-7	Clay loam--------	CL	A-6	0	100	100	90-100	70-90	30-40	10-15
	7-60	Stratified clay loam to sandy loam.	CL	A-6	0	100	100	90-95	65-80	30-40	10-20
13--------------- Bowbells	0-10	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-95	60-90	20-40	5-20
	10-28	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-80	20-45	10-25
	28-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	60-80	20-45	10-25
14, 15----------- Bryant	0-4	Silt loam--------	ML, CL, CL-ML	A-6, A-4	0	100	100	85-100	70-100	25-40	3-15
	4-14	Clay loam, silt loam, silty clay loam.	CL, ML, CL-ML	A-6, A-4	0	100	100	85-100	70-100	25-40	3-15
	14-60	Silty clay loam, loam, silt loam.	CL, ML, CL-ML	A-6, A-4	0	100	100	85-100	70-100	25-40	3-15
16*:											
Bryant-----------	0-4	Silt loam--------	ML, CL, CL-ML	A-6, A-4	0	100	100	85-100	70-100	25-40	3-15
	4-14	Clay loam, silt loam, silty clay loam.	CL, ML, CL-ML	A-6, A-4	0	100	100	85-100	70-100	25-40	3-15
	14-60	Silty clay loam, loam, silt loam.	CL, ML, CL-ML	A-6, A-4	0	100	100	85-100	70-100	25-40	3-15
Cambert----------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-70	20-30	5-10
	4-13	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	13-21	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
17--------------- Bryant Variant	0-10	Silt loam--------	CL-ML	A-4	0	100	100	95-100	70-90	25-30	5-10
	10-42	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	42-60	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-40	5-15
18, 19----------- Busby	0-5	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	5-11	Fine sandy loam, sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	60-90	35-75	20-30	NP-10
	11-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
20*:											
Busby------------	0-5	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	5-11	Fine sandy loam, sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	60-90	35-75	20-30	NP-10
	11-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
20*:											
Fleak	0-7	Loamy sand	SM	A-2, A-4	0-5	95-100	95-100	45-80	20-40	---	NP
	7-16	Fine sand, loamy fine sand.	SM	A-2, A-4	0-5	95-100	95-100	40-85	20-40	---	NP
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
21*:											
Busby	0-5	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	5-11	Fine sandy loam, sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	60-90	35-75	20-30	NP-10
	11-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
Twilight	0-5	Fine sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	5-25	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
22*:											
Busby	0-5	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	5-11	Fine sandy loam, sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	60-90	35-75	20-30	NP-10
	11-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
Twilight	0-5	Fine sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	5-25	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
Fleak	0-7	Loamy sand	SM	A-4, A-2	0-5	95-100	95-100	45-80	20-40	---	NP
	7-16	Fine sand, loamy fine sand.	SM	A-2, A-4	0-5	95-100	95-100	40-85	20-40	---	NP
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
23*:											
Busby	0-5	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	5-11	Fine sandy loam, sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	60-90	35-75	20-30	NP-10
	11-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
Yamac	0-4	Loam	CL-ML	A-4	0	85-100	80-100	60-85	55-75	25-30	5-10
	4-11	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	65-90	60-80	25-35	5-15
	11-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	60-85	55-75	25-35	5-15
Fleak	0-7	Loamy sand	SM	A-4, A-2	0-5	95-100	95-100	45-80	20-40	---	NP
	7-16	Fine sand, loamy fine sand.	SM	A-2, A-4	0-5	95-100	95-100	40-85	20-40	---	NP
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
24*:											
Busby	0-5	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	5-11	Fine sandy loam, sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	60-90	35-75	20-30	NP-10
	11-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
Yetull	0-6	Fine sandy loam	SM, ML	A-4	0-10	95-100	95-100	70-90	35-55	---	NP
	6-60	Loamy coarse sand, sand, loamy sand.	SM, SP-SM	A-1, A-3, A-2	0-10	95-100	95-100	45-70	5-30	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
25: Cabba	0-5	Loam	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
26*: Cabba	0-5	Loam	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Badland.											
27*: Cabba	0-5	Loam	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Barkof	0-7	Silty clay	CL, CH	A-7	0	100	100	90-100	85-95	45-60	20-30
	7-29	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-90	45-65	25-45
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
28*: Cabba	0-5	Loam	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Brandenburg	0-5	Channery loam	CL-ML, GM-GC, CL, SM-SC	A-2, A-4, A-6	0-5	65-85	55-75	45-65	30-55	20-35	5-15
	5-10	Channery loam, very channery loam.	GM-GC	A-2, A-4	0-10	40-70	30-60	25-50	20-45	20-30	5-10
	10-60	Fragmental material.	GP	A-1	80-85	15-25	5-10	0-5	0	---	NP
29*: Cabba	0-5	Loam	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dast	0-3	Fine sandy loam	SM, ML	A-4, A-2	0	80-100	75-100	65-90	30-55	15-25	NP-5
	3-25	Fine sandy loam, sandy loam.	SM, ML	A-4, A-2	0	80-100	75-100	55-85	30-55	15-25	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
30*: Cabba	0-5	Loam	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
30*:											
Wabek	0-7	Sandy loam	SM	A-2, A-4	0-5	85-100	85-100	60-70	30-40	---	NP
	7-60	Very gravelly sand, very gravelly loamy sand.	GM, GP-GM SM, SP_SM	A-1	0-5	40-60	30-50	15-40	5-20	---	NP
Dast	0-3	Fine sandy loam	SM, ML	A-4, A-2	0	80-100	75-100	65-90	30-55	15-25	NP-5
	3-25	Fine sandy loam, sandy loam.	SM, ML	A-4, A-2	0	80-100	75-100	55-85	30-55	15-25	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
31 Cabbart	0-4	Silt loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-13	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
32*:											
Cabbart	0-4	Silt loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-13	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Badland.											
33*:											
Cabbart	0-4	Silt loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-13	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kirby	0-5	Very channery loam.	GM, GM-GC	A-2, A-1, A-4	0-15	40-60	30-50	25-45	20-40	15-25	NP-10
	5-18	Extremely channery loam, extremely channery sandy loam, very channery loam.	GP-GM, GM, GM-GC	A-2, A-1	10-30	20-60	10-50	5-40	5-35	15-25	NP-10
	18-60	Fragmental material.	GP	A-1	40-60	5-15	0-10	0-5	0	---	NP
34*:											
Cabbart	0-4	Silt loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-13	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Twilight	0-5	Fine sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	5-25	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
35*, 36*:											
Cabbart	0-4	Silt loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-13	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
35*, 36* Yawdim----------	0-6	Silty clay-------	CH, CL	A-7	0	100	100	90-100	85-95	40-60	20-40
	6-15	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	90-100	70-95	25-60	10-40
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
37--------------- Cambert	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-70	20-30	5-10
	4-13	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	13-21	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
38*: Cambert---------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-70	20-30	5-10
	4-13	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	13-21	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
Barkof----------	0-7	Silty clay-------	CL, CH	A-7	0	100	100	90-100	85-95	45-60	20-30
	7-29	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-90	45-65	25-45
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cabba-----------	0-5	Loam-------------	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
39*: Cambert---------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-70	20-30	5-10
	4-13	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	13-21	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cabba-----------	0-5	Loam-------------	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
40*: Cambert---------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-70	20-30	5-10
	4-13	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	13-21	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
Dast------------	0-3	Fine sandy loam	SM, ML	A-4, A-2	0	80-100	75-100	65-90	30-55	15-25	NP-5
	3-25	Fine sandy loam, sandy loam.	SM, ML	A-4, A-2	0	80-100	75-100	55-85	30-55	15-25	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cabba-----------	0-5	Loam-------------	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silt loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
41----------------- Cambeth	0-6	Silt loam--------	CL-ML, ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	6-11	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-20
	11-35	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-20
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
42*: Cambeth----------	0-6	Silt loam--------	CL-ML, ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	6-11	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-20
	11-35	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-20
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
42*: Cabbart----------	0-4	Silt loam--------	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-13	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
43*: Cambeth----------	0-6	Silt loam--------	CL-ML, ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	6-11	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-20
	11-35	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-20
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
Twilight---------	0-5	Fine sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	5-25	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cabbart----------	0-4	Silt loam--------	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-13	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
44----------------- Cherry	0-3	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	85-100	60-90	25-35	5-15
	3-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-95	25-40	10-20
45*: Cherry-----------	0-3	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	85-100	60-90	25-35	5-15
	3-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-95	25-40	10-20
Havrelon---------	0-5	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-75	20-30	5-10
	5-60	Stratified silty clay loam to very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-80	20-35	5-15
Trembles---------	0-6	Fine sandy loam	SM, ML	A-4	0	100	100	75-85	45-55	20-30	NP-5
	6-16	Stratified fine sandy loam to loam.	SM, ML	A-2, A-4	0	100	100	65-85	30-55	20-30	NP-5
	16-60	Stratified fine sandy loam to loamy sand.	SM	A-2, A-4	0	100	100	60-80	25-50	15-25	NP-5

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
46, 47, 48, 49--- Chinook	0-6	Fine sandy loam	SM	A-4	0	100	100	70-85	35-50	15-25	NP-5
	6-29	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	70-85	35-50	15-25	NP-5
	29-60	Fine sandy loam, loamy fine sand, sandy loam.	SM	A-4, A-2	0	100	100	60-80	25-45	15-25	NP-5
50--------------- Creed	0-8	Loam-------------	CL-ML, SM-SC	A-4	0	90-100	75-100	65-95	45-75	20-30	5-10
	8-24	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	90-100	75-100	70-100	60-95	35-60	15-35
	24-60	Silty clay loam, clay loam, silty clay.	CL, SC	A-6, A-7	0	90-100	75-100	60-100	35-90	30-50	15-25
51*: Creed-----------	0-8	Loam-------------	CL-ML, SM-SC	A-4	0	90-100	75-100	65-95	45-75	20-30	5-10
	8-24	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	90-100	75-100	70-100	60-95	35-60	15-35
	24-60	Silty clay loam, clay loam, silty clay.	CL, SC	A-6, A-7	0	90-100	75-100	60-100	35-90	30-50	15-25
Gerdrum---------	0-7	Clay loam--------	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	7-11	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	11-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
52, 53----------- Dast	0-3	Fine sandy loam	SM, ML	A-4, A-2	0	80-100	75-100	65-90	30-55	15-25	NP-5
	3-25	Fine sandy loam, sandy loam.	SM, ML	A-4, A-2	0	80-100	75-100	55-85	30-55	15-25	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
54*, 55*: Dast------------	0-3	Fine sandy loam	SM, ML	A-4, A-2	0	80-100	75-100	65-90	30-55	15-25	NP-5
	3-25	Fine sandy loam, sandy loam.	SM, ML	A-4, A-2	0	80-100	75-100	55-85	30-55	15-25	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
Blanchard-------	0-7	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	7-60	Fine sand, loamy sand, loamy fine sand.	SM	A-2	0	100	100	60-85	15-35	---	NP
56--------------- Dimmick	0-7	Silty clay-------	CH, CL	A-7	0	100	100	90-100	75-95	40-60	15-35
	7-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	20-45
57--------------- Dimmick	0-7	Clay-------------	CH, CL	A-7	0	100	100	90-100	75-95	40-60	15-35
	7-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	20-45
58, 59----------- Ethridge	0-3	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-95	25-45	10-20
	3-11	Silty clay, silty clay loam, clay.	CL	A-7	0	100	95-100	95-100	90-95	40-50	20-30
	11-60	Silty clay loam, clay loam, silty clay.	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	10-25
60--------------- Evanston	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-90	65-70	25-35	5-15
	8-26	Clay loam, loam, silty clay loam.	CL	A-6	0-5	95-100	95-100	85-100	65-80	25-35	10-15
	26-60	Loam, clay loam, fine sandy loam.	CL	A-6	0-5	95-100	95-100	70-90	50-65	25-35	10-15

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
61 Evanston	0-8	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-90	65-70	25-35	5-15
	8-26	Clay loam, loam, silty clay loam.	CL	A-6	0-5	95-100	95-100	85-100	65-80	25-35	10-15
	26-61	Loam, clay loam, fine sandy loam.	CL	A-6	0-5	95-100	95-100	70-90	50-65	25-35	10-15
62*:											
Evanston	0-8	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-90	65-70	25-35	5-15
	8-26	Clay loam, loam, silty clay loam.	CL	A-6	0-5	95-100	95-100	85-100	65-80	25-35	10-15
	26-60	Loam, clay loam, fine sandy loam.	CL	A-6	0-5	95-100	95-100	70-90	50-65	25-35	10-15
Gerdrum	0-7	Clay loam	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	7-11	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	11-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
63 Farland	0-4	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	70-90	20-35	5-15
	4-15	Silty clay loam, clay loam.	CL	A-7, A-6	0	100	100	90-100	75-95	30-45	10-20
	15-60	Loam, silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	100	85-100	70-90	25-40	5-20
64 Farnuf	0-6	Loam	ML	A-4	0	80-100	75-100	60-100	55-80	20-35	NP-10
	6-15	Clay loam, loam, silty clay loam.	CL	A-6	0	80-100	75-100	65-95	50-90	25-40	10-20
	15-60	Loam, clay loam, silt loam.	CL, CL-ML	A-6, A-4	0	80-100	75-100	65-95	50-80	25-35	5-15
65, 66 Floweree	0-6	Silt loam	ML	A-4	0	100	100	90-100	70-90	20-35	NP-10
	6-10	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0	100	100	95-100	85-95	25-40	5-15
	10-60	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0	100	100	95-100	85-95	25-40	5-15
67*:											
Floweree	0-6	Silt loam	ML	A-4	0	100	100	90-100	70-90	20-35	NP-10
	6-10	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0	100	100	95-100	85-95	25-40	5-15
	10-60	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0	100	100	95-100	85-95	25-40	5-15
Cambeth	0-6	Silt loam	CL-ML, ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	6-11	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-20
	11-35	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-40	5-20
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
68, 69 Gerdrum	0-7	Clay loam	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	7-11	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	11-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
70*:											
Gerdrum	0-7	Clay loam	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	7-11	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	11-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
70*:											
Absher----------	0-7	Clay loam--------	CL	A-6	0	95-100	75-100	70-100	60-90	25-40	10-20
	7-11	Silty clay, clay, clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-60	20-40
	11-60	Clay loam, clay, sandy clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-55	20-35
71*, 72*:											
Gerdrum---------	0-7	Clay loam--------	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	7-11	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	11-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
Yawdim----------	0-6	Silty clay-------	CH, CL	A-7	0	100	100	90-100	85-95	40-60	20-40
	6-15	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	90-100	70-95	25-60	10-40
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
Fleak-----------	0-7	Loamy sand-------	SM	A-4, A-2	0-5	95-100	95-100	45-80	20-40	---	NP
	7-16	Fine sand, loamy fine sand.	SM	A-2, A-4	0-5	95-100	95-100	40-85	20-40	---	NP
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
73--------------- Glendive	0-6	Sandy loam-------	SM, ML	A-4, A-2	0	100	100	65-85	30-55	20-35	NP-10
	6-60	Stratified loamy fine sand to silt loam.	SM, SM-SC	A-4, A-2	0	95-100	75-100	60-90	25-50	15-25	NP-10
74--------------- Glendive	0-6	Loam-------------	ML	A-4	0	100	100	75-95	65-90	20-35	NP-10
	6-60	Stratified loamy fine sand to silt loam.	SM, SM-SC	A-4, A-2	0	95-100	75-100	60-90	25-50	15-25	NP-10
75--------------- Glendive	0-6	Loam-------------	ML, CL-ML	A-4	0	100	100	75-95	65-90	20-30	NP-10
	6-60	Stratified loamy fine sand to silt loam.	SM, SM-SC	A-4, A-2	0	85-100	75-100	55-85	25-50	15-25	NP-10
76--------------- Glendive	0-6	Silty clay loam	ML	A-4	0	100	100	75-95	65-90	20-35	NP-10
	6-60	Stratified loamy fine sand to silt loam.	SM, SM-SC	A-4, A-2	0	95-100	75-100	60-90	25-50	15-25	NP-10
77--------------- Glendive	0-6	Silty clay loam	CL	A-6	0	100	100	90-100	80-95	30-40	10-20
	6-60	Stratified loamy fine sand to silt loam.	SM, SM-SC	A-4, A-2	0	85-100	75-100	55-85	25-50	15-25	NP-10
78*:											
Glendive--------	0-6	Sandy loam-------	SM	A-4, A-2	0	100	100	60-80	30-50	15-25	NP-5
	6-60	Stratified loamy fine sand to silt loam.	SM, SM-SC	A-4, A-2	0	85-100	75-100	55-85	25-50	15-25	NP-10
Hanly-----------	0-4	Loamy fine sand	SM	A-2	0	100	100	50-75	15-30	---	NP
	4-60	Stratified fine sandy loam to sand.	SM, SP-SM	A-2, A-3	0	100	100	50-85	5-25	---	NP
79--------------- Hanly	0-4	Loamy fine sand	SM	A-2	0	100	100	50-75	15-30	---	NP
	4-60	Stratified fine sandy loam to sand.	SM, SP-SM	A-2, A-3	0	100	100	50-85	5-25	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
80, 81----------- Harlem	0-5	Silty clay-------	CL, CH	A-7	0	100	100	90-100	75-90	40-65	20-40
	5-60	Stratified clay to silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-70	15-45
82, 83----------- Havre	0-5	Silt loam--------	CL-ML	A-4	0	100	100	80-95	60-90	20-30	5-10
	5-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	70-95	60-80	20-35	5-15
84, 85----------- Havre	0-9	Silty clay loam	CL	A-6	0	100	100	85-100	75-95	25-40	10-20
	9-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	70-95	60-80	20-35	5-15
86, 87----------- Havrelon	0-5	Loam-------------	CL-ML	A-4	0	100	100	85-100	60-95	20-30	5-10
	5-60	Stratified silty clay loam to very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-80	25-40	5-15
88--------------- Havrelon	0-5	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-75	25-30	5-10
	5-60	Stratified fine sandy loam to sandy clay loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	100	100	70-95	40-60	25-35	5-15
89, 90----------- Havrelon	0-6	Silty clay loam	CL-ML	A-4	0	100	100	85-100	60-95	20-30	5-10
	6-60	Stratified silty clay loam to very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-80	25-40	5-15
91, 92, 93------- Hillon	0-7	Loam-------------	ML, CL, CL-ML	A-4, A-6	0-5	85-100	80-100	80-90	65-75	20-35	NP-15
	7-60	Loam, clay loam	CL	A-6	0-5	85-100	80-100	80-90	65-80	25-35	10-20
94*:											
Hillon----------	0-7	Loam-------------	ML, CL, CL-ML	A-4, A-6	0-5	85-100	80-100	80-90	65-75	20-35	NP-15
	7-60	Loam, clay loam	CL	A-6	0-5	85-100	80-100	80-90	65-80	25-35	10-20
Badland.											
95*:											
Hillon----------	0-7	Loam-------------	ML, CL, CL-ML	A-4, A-6	0-5	85-100	80-100	80-90	65-75	20-35	NP-15
	7-60	Loam, clay loam	CL	A-6	0-5	85-100	80-100	80-90	65-80	25-35	10-20
Yamac-----------	0-4	Loam-------------	CL-ML	A-4	0	85-100	80-100	60-85	55-75	25-30	5-10
	4-11	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	65-90	60-80	25-35	5-15
	11-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	60-85	55-75	25-35	5-15
Fleak-----------	0-7	Loamy sand-------	SM	A-4, A-2	0-5	95-100	95-100	45-80	20-40	---	NP
	7-16	Fine sand, loamy fine sand.	SM	A-2, A-4	0-5	95-100	95-100	40-85	20-40	---	NP
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
96--------------- Hoffmanville	0-5	Silty clay-------	CL, CH	A-7	0	100	100	90-100	85-95	40-55	15-30
	5-28	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0	100	100	90-100	80-95	35-55	15-35
	28-60	Loamy fine sand, fine sand, gravelly loamy fine sand.	SM, SP-SM	A-1, A-2, A-3	0	65-100	50-100	40-90	5-35	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
97, 98: Kremlin	0-6	Loam	CL-ML	A-4	0	95-100	90-100	75-95	50-75	25-30	5-10
	6-10	Loam, silt loam, clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	75-95	55-80	25-35	5-15
	10-18	Loam, silt loam, clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	75-95	55-80	25-35	5-15
	18-60	Stratified sandy loam to silt loam.	ML, CL-ML	A-4	0	90-100	85-100	70-90	50-75	20-30	NP-10
99: Lehr	0-4	Loam	ML, CL-ML	A-4	0	95-100	95-100	85-95	60-80	20-35	5-10
	4-18	Loam, clay loam	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-95	60-75	25-40	5-15
	18-60	Very gravelly fine sand, extremely gravelly loamy sand.	GM, GP-GM	A-1	0-5	35-60	20-50	10-35	5-15	---	NP
100, 101: Lisk	0-5	Sandy loam	SM	A-4	0	100	100	60-75	35-50	20-30	NP-5
	5-15	Sandy loam, fine sandy loam.	ML, SM	A-4	0	100	100	60-85	35-60	20-30	NP-5
	15-41	Sandy loam, fine sandy loam.	ML, SM	A-4, A-2	0	100	100	55-80	30-55	20-30	NP-5
	41-60	Loamy sand, loamy fine sand.	SM	A-1, A-2	0	100	100	45-80	15-30	---	NP
102: Lohler	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-95	25-50	10-30
	6-60	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	80-95	45-70	25-50
103, 104: Lohler	0-5	Silty clay	CH, CL	A-7	0	100	100	95-100	80-95	45-70	25-50
	5-60	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	80-95	45-70	25-50
105: Lonna	0-7	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-35	10-15
	7-12	Silt loam, silty clay loam.	CL-ML, CL	A-6, A-4	0	100	100	95-100	75-95	25-40	5-15
	12-60	Silt loam, silty clay loam.	CL-ML, CL	A-6, A-4	---	100	100	95-100	75-95	25-40	5-15
106*:											
Lonna	0-7	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-35	10-15
	7-12	Silt loam, silty clay loam.	CL-ML, CL	A-6, A-4	0	100	100	95-100	75-95	25-40	5-15
	12-60	Silt loam, silty clay loam.	CL-ML, CL	A-6, A-4	---	100	100	95-100	75-95	25-40	5-15
Havre	0-5	Silt loam	ML, CL-ML	A-4	0	100	100	80-95	60-75	20-30	NP-10
	5-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	50-70	20-35	5-15
Glendive	0-6	Sandy loam	SM, ML, SM-SC, CL-ML	A-4, A-2	0	100	100	65-85	30-55	20-30	NP-10
	6-60	Stratified loamy fine sand to silt loam.	SM, SM-SC	A-2, A-4	0	95-100	75-100	60-80	25-50	15-25	NP-10
107, 108, 109: Macar	0-3	Loam	CL-ML	A-4	0	100	100	75-95	55-70	25-30	5-10
	3-34	Clay loam, loam, silty clay loam.	CL-ML, CL	A-6, A-4	0	100	100	75-95	60-85	25-40	5-15
	34-60	Stratified sandy clay loam to silt loam.	CL-ML, CL	A-6, A-4	0	90-100	85-100	70-90	50-75	25-35	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
110------------- Macar	0-7	Loam-------------	CL-ML	A-4	0	100	100	75-95	55-70	25-30	5-10
	7-20	Clay loam, loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	75-95	60-85	25-40	5-15
	20-60	Clay loam, loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	75-95	60-85	25-40	5-15
111*:											
Macar-----------	0-3	Loam-------------	CL-ML	A-4	0	100	100	75-95	55-70	25-30	5-10
	3-34	Clay loam, loam, silty clay loam.	CL-ML, CL	A-6, A-4	0	100	100	75-95	60-85	25-40	5-15
	34-60	Stratified sandy clay loam to silt loam.	CL-ML, CL	A-6, A-4	0	90-100	85-100	70-90	50-75	25-35	5-15
Cabba-----------	0-5	Loam-------------	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
112*:											
Macar-----------	0-3	Loam-------------	CL-ML	A-4	0	100	100	75-95	55-70	25-30	5-10
	3-34	Clay loam, loam, silty clay loam.	CL-ML, CL	A-6, A-4	0	100	100	75-95	60-85	25-40	5-15
	34-60	Stratified sandy clay loam to silt loam.	CL-ML, CL	A-6, A-4	0	90-100	85-100	70-90	50-75	25-35	5-15
Cambert---------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-70	20-30	5-10
	4-13	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	13-21	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
113------------- Marias	0-7	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	40-70	25-50
	7-33	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-95	40-70	25-50
	33-60	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-95	40-70	25-50
114------------- Marvan	0-4	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	40-70	25-50
	4-35	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-100	45-70	25-50
	35-60	Clay, silty clay silty clay loam.	CL, CH	A-7	0	100	100	90-100	75-100	45-70	25-50
115*:											
Neldore---------	0-3	Clay-------------	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	3-16	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Badland.											
Bascovy---------	0-2	Silty clay-------	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-11	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	11-23	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neldore---------	0-3	Clay-------------	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	3-16	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
116*:											
Bascovy----------	0-2	Silty clay--------	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-11	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	11-23	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
117*:											
Neldore----------	0-3	Clay-------------	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	3-16	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Yamac-----------	0-4	Loam-------------	CL-ML	A-4	0	85-100	80-100	60-85	55-75	25-30	5-10
	4-11	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	65-90	60-80	25-35	5-15
	11-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	60-85	55-75	25-35	5-15
Badland.											
118-------------- Pendroy	0-14	Clay-------------	CH	A-7	0	100	100	90-100	75-95	60-85	40-60
	14-47	Clay-------------	CH	A-7	0	100	100	90-100	75-95	60-85	40-60
	47-69	Silty clay, clay	CH	A-7	0	100	100	80-95	50-75	30-55	
119-------------- Ridgelawn	0-7	Silt loam---------	CL-ML	A-4	0	100	100	85-95	65-80	20-35	5-10
	7-24	Loam, silt loam, silty clay loam.	CL-ML, CL	A-6, A-4	0	100	100	80-95	60-80	20-35	5-15
	24-60	Fine sand, loamy fine sand, gravelly loamy sand.	SM	A-2, A-1	0	65-100	50-100	30-75	10-35	---	NP
120, 121--------- Rominell	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-80	25-30	5-10
	4-9	Very fine sandy loam, fine sandy loam, loam.	ML, SM, CL-ML, SM-SC	A-4	0	100	100	70-95	40-75	25-35	5-10
	9-25	Clay loam, loam, sandy clay loam.	CL-ML, ML, SM-SC, CL, SC	A-4, A-6	0	100	100	85-90	40-75	25-35	5-15
	25-60	Clay loam, loam, sandy loam.	CL-ML, ML, SM, SM-SC	A-4		0	90-100	60-90	45-70	20-30	NP-10
122*:											
Rominell---------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-80	25-30	5-10
	4-9	Very fine sandy loam, fine sandy loam, loam.	ML, SM, CL-ML, SM-SC	A-4	0	100	100	70-95	40-75	25-35	5-10
	9-25	Clay loam, loam, sandy clay loam.	CL-ML, SM-SC, CL, SC	A-4, A-6	0	100	100	85-90	40-75	25-35	5-15
	25-60	Clay loam, loam, sandy loam.	CL-ML, ML, SM, SM-SC	A-4	0	90-100	85-100	60-90	45-70	20-30	NP-10
Yamac-----------	0-4	Loam-------------	CL-ML	A-4	0	85-100	80-100	60-85	55-75	25-30	5-10
	4-11	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	65-90	60-80	25-35	5-15
	11-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	60-85	55-75	25-35	5-15
123-------------- Savage	0-7	Silty clay loam	CL, CL-ML	A-6, A-4	0	95-100	95-100	90-100	80-95	25-40	5-15
	7-28	Clay, silty clay, silty clay loam.	CL	A-7, A-6	0	95-100	95-100	85-100	75-95	35-50	15-30
	28-60	Silty clay, silty clay loam, clay.	CL	A-7, A-6	0-5	90-100	85-100	75-100	65-95	30-50	10-30

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
124, 125---------Shambo	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-75	25-30	5-10
	4-14	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-40	5-15
	14-60	Stratified loam to silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-40	5-15
126*:											
Shambo----------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-75	25-30	5-10
	4-14	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-40	5-15
	14-60	Stratified loam to silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-40	5-15
Cabba-----------	0-5	Loam-------------	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
127*:											
Shambo----------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-75	25-30	5-10
	4-14	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-40	5-15
	14-60	Stratified loam to silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-40	5-15
Cambert---------	0-4	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-70	20-30	5-10
	4-13	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	13-21	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
128, 129, 130----Sunburst	0-3	Clay loam--------	CL	A-6, A-7	0-10	95-100	85-95	85-95	75-85	35-45	15-20
	3-19	Clay, clay loam, silty clay loam.	CL	A-7	0-10	95-100	85-95	85-95	85-95	40-50	20-30
	19-60	Clay, silty clay loam, silty clay.	CL	A-7	0-10	95-100	85-95	85-95	85-95	40-50	20-30
131, 132---------Tally	0-4	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4, A-2	0	90-100	80-100	60-100	30-55	20-30	NP-10
	4-20	Fine sandy loam, sandy loam.	SM, SM-SC	A-4, A-2	0	90-100	80-100	60-100	25-50	15-25	NP-10
	20-31	Sandy loam, fine sandy loam, loamy fine sand.	SM	A-4, A-2	0	90-100	80-100	60-100	15-50	15-25	NP-5
	31-60	Loamy fine sand, fine sand, sandy loam.	SM	A-2	0	90-100	80-100	60-85	15-35	---	NP
133--------------Telstad	0-4	Loam-------------	CL-ML	A-4	0-5	85-100	80-100	65-90	50-70	25-30	5-10
	4-13	Clay loam, loam	CL	A-6	0-5	95-100	90-100	80-95	60-80	30-40	10-20
	13-22	Clay loam, loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	80-95	60-80	25-35	5-15
	22-60	Loam, clay loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	75-90	55-75	25-35	5-15
134*, 135*:											
Telstad---------	0-4	Loam-------------	CL-ML	A-4	0-5	85-100	80-100	65-90	50-70	25-30	5-10
	4-13	Clay loam, loam	CL	A-6	0-5	95-100	90-100	80-95	60-80	30-40	10-20
	13-22	Clay loam, loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	80-95	60-80	25-35	5-15
	22-60	Loam, clay loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	75-90	55-75	25-35	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
134*, 135*:											
Hillon----------	0-7	Loam-------------	ML, CL, CL-ML	A-4, A-6	0-5	85-100	80-100	80-90	65-75	20-35	NP-15
	7-60	Loam, clay loam	CL	A-6	0-5	85-100	80-100	80-90	65-80	25-35	10-20
136*:											
Telstad---------	0-4	Loam-------------	CL-ML	A-4	0-5	85-100	80-100	65-90	50-70	25-30	5-10
	4-13	Clay loam, loam	CL	A-6	0-5	95-100	90-100	80-95	60-80	30-40	10-20
	13-22	Clay loam, loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	80-95	60-80	25-35	5-15
	22-60	Loam, clay loam	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	75-90	55-75	25-35	5-15
Thoeny----------	0-6	Loam-------------	CL	A-6	0-5	95-100	85-95	85-95	65-75	25-35	10-15
	6-31	Clay loam, clay	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
	31-60	Clay loam--------	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
137-------------- Thoeny	0-6	Loam-------------	CL	A-6	0-5	95-100	85-95	85-95	65-75	25-35	10-15
	6-31	Clay loam, clay	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
	31-60	Clay loam--------	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
138*:											
Thoeny----------	0-6	Loam-------------	CL	A-6	0-5	95-100	85-95	85-95	65-75	25-35	10-15
	6-31	Clay loam, clay	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
	31-60	Clay loam--------	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
Absher----------	0-7	Clay loam--------	CL	A-6	0	95-100	75-100	70-100	60-90	25-40	10-20
	7-11	Silty clay, clay, clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-60	20-40
	11-60	Clay loam, clay, sandy clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-55	20-35
139, 140--------- Trembles	0-6	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-55	20-30	NP-5
	6-16	Stratified fine sandy loam to loam.	SM, ML	A-4	0	100	100	65-85	35-60	20-30	NP-5
	16-60	Stratified fine sandy loam to loamy sand.	SM	A-4, A-2	0	100	100	60-80	25-50	15-25	NP-5
141-------------- Turner	0-7	Loam-------------	CL-ML	A-4	0-5	85-100	80-100	55-75	50-70	25-30	5-10
	7-33	Clay loam, loam, gravelly loam.	CL, GC, SC	A-6	0-5	70-100	65-100	45-75	40-70	30-40	10-20
	33-60	Very gravelly loamy sand, very gravelly sand, extremely gravelly sand.	GP, GM, GP-GM	A-1	10-30	30-50	20-50	10-35	0-15	---	NP
142*:											
Twilight--------	0-5	Fine sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	5-25	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
Yetull----------	0-6	Fine sandy loam	SM, ML	A-4	0-10	95-100	95-100	70-90	35-55	---	NP
	6-60	Loamy coarse sand, sand, loamy sand.	SM, SP-SM	A-1, A-3, A-2	0-10	95-100	95-100	45-70	5-30	---	NP
143, 144. Typic Fluvaquents											
145. Typic Ustifluvents											

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
146*:											
Typic Ustorthents.											
Typic Ustifluvents.											
147*:											
Ustic Torriorthents.											
Ustic Torrifluvents.											
148--------------	0-2	Clay-------------	CL, CH	A-7	0	100	100	95-100	75-95	40-65	20-45
Vanda	2-60	Clay, silty clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	95-100	80-95	35-65	15-45
149, 150---------	0-7	Clay loam--------	CL	A-6	0-10	90-100	85-100	75-95	60-80	25-35	10-15
Vida	7-19	Clay loam, loam	CL	A-6	0-10	90-100	85-100	70-95	50-85	30-40	10-20
	19-60	Clay loam, loam	CL	A-6	0-10	90-100	85-100	70-95	50-80	25-40	10-20
151*, 152*:											
Vida------------	0-7	Clay loam--------	CL	A-6	0-10	90-100	85-100	75-95	60-80	25-35	10-15
	7-19	Clay loam, loam	CL	A-6	0-10	90-100	85-100	70-95	50-85	30-40	10-20
	19-60	Clay loam, loam	CL	A-6	0-10	90-100	85-100	70-95	50-80	25-40	10-20
Zahill----------	0-6	Loam-------------	CL-ML, ML	A-4	0-10	90-100	85-95	80-90	60-75	20-30	NP-10
	6-22	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
	22-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
153, 154---------	0-7	Sandy loam-------	SM	A-2, A-4	0-5	85-100	85-100	60-70	30-40	---	NP
Wabek	7-60	Very gravelly sand, very gravelly loamy sand.	GM, GP-GM SM, SP-SM	A-1	0-5	40-60	30-50	15-40	5-20	---	NP
155--------------	0-7	Clay-------------	CL	A-7	0	90-100	90-100	80-100	65-90	40-50	15-25
Weingart	7-21	Clay, silty clay	CL, CH	A-7	0	90-100	90-100	80-100	75-95	40-65	20-40
	21-30	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	90-100	90-100	75-100	70-90	35-60	15-35
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
156, 157---------	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-95	60-90	25-35	5-15
Williams	8-23	Clay loam, loam	CL	A-6	0-5	95-100	95-100	80-100	60-80	30-40	10-20
	23-60	Clay loam, loam	CL, CL-ML	A-6, A-4	0-5	95-100	95-100	80-100	60-80	25-40	5-15
158*:											
Williams--------	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-95	60-90	25-35	5-15
	8-23	Clay loam, loam	CL	A-6	0-5	95-100	95-100	80-100	60-80	30-40	10-20
	23-60	Clay loam, loam	CL, CL-ML	A-6, A-4	0-5	95-100	95-100	80-100	60-80	25-40	5-15
Vida------------	0-7	Clay loam--------	CL	A-6	0-10	90-100	85-100	75-95	60-80	25-35	10-15
	7-19	Clay loam, loam	CL	A-6	0-10	90-100	85-100	70-95	50-85	30-40	10-20
	19-60	Clay loam, loam	CL	A-6	0-10	90-100	85-100	70-95	50-80	25-40	10-20
159, 160, 161----	0-4	Loam-------------	CL-ML	A-4	0	85-100	80-100	60-85	55-75	25-30	5-10
Yamac	4-11	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	65-90	60-80	25-35	5-15
	11-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	60-85	55-75	25-35	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
162*:											
Yamac	0-4	Loam	CL-ML	A-4	0	85-100	80-100	60-85	55-75	25-30	5-10
	4-11	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	65-90	60-80	25-35	5-15
	11-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	60-85	55-75	25-35	5-15
Twilight	0-5	Fine sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	5-25	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
163*:											
Yamac	0-4	Loam	CL-ML	A-4	0	85-100	80-100	60-85	55-75	25-30	5-10
	4-11	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	65-90	60-80	25-35	5-15
	11-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	60-85	55-75	25-35	5-15
Twilight	0-5	Fine sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	5-25	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
Fleak	0-7	Loamy sand	SM	A-4, A-2	0-5	95-100	95-100	45-80	20-40	---	NP
	7-16	Fine sand, loamy fine sand.	SM	A-2, A-4	0-5	95-100	95-100	40-85	20-40	---	NP
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
164 Yawdim	0-6	Silty clay	CH, CL	A-7	0	100	100	90-100	85-95	40-60	20-40
	6-15	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	90-100	70-95	25-60	10-40
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
165*:											
Yawdim	0-6	Silty clay	CH, CL	A-7	0	100	100	90-100	85-95	40-60	20-40
	6-15	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	90-100	70-95	25-60	10-40
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
Badland.											
Cabbart	0-4	Silt loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-13	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
166*:											
Yawdim	0-6	Silty clay	CH, CL	A-7	0	100	100	90-100	85-95	40-60	20-40
	6-15	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	90-100	70-95	25-60	10-40
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
Badland.											
Gerdrum	0-7	Clay loam	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	7-11	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	11-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
167*:											
Yawdim----------	0-6	Silty clay-------	CH, CL	A-7	0	100	100	90-100	85-95	40-60	20-40
	6-15	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	90-100	70-95	25-60	10-40
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
Kirby-----------	0-5	Very channery loam.	GM, GM-GC	A-2, A-1, A-4	0-15	40-60	30-50	25-45	20-40	15-25	NP-10
	5-18	Extremely channery loam, extremely channery sandy loam, very channery loam.	GP-GM, GM, GM-GC	A-2, A-1	10-30	20-60	10-50	5-40	5-35	15-25	NP-10
	18-60	Fragmental material.	GP	A-1	40-60	5-15	0-10	0-5	0	---	NP
168, 169, 170---- Zahill	0-6	Loam-------------	CL-ML, ML	A-4	0-10	90-100	85-95	80-90	60-75	20-30	NP-10
	6-22	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
	22-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
171*:											
Zahill----------	0-6	Loam-------------	CL-ML, ML	A-4	0-10	90-100	85-95	80-90	60-75	20-30	NP-10
	6-22	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
	22-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
Badland.											
172*, 173*:											
Zahill----------	0-6	Loam-------------	CL-ML, ML	A-4	0-10	90-100	85-95	80-90	60-75	20-30	NP-10
	6-22	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
	22-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
Cabba-----------	0-5	Loam-------------	ML, CL-ML	A-4	0-5	90-100	85-100	70-90	60-80	20-30	NP-10
	5-15	Silt loam, silty clay loam, loam.	GC, CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	85-100	80-95	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
174*:											
Zahill----------	0-6	Loam-------------	CL-ML, ML	A-4	0-10	90-100	85-95	80-90	60-75	20-30	NP-10
	6-22	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
	22-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
Yawdim----------	0-6	Silty clay-------	CH, CL	A-7	0	100	100	90-100	85-95	40-60	20-40
	6-15	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	90-100	70-95	25-60	10-40
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
175*:											
Zahill----------	0-6	Loam-------------	CL-ML, ML	A-4	0-10	90-100	85-95	80-90	60-75	20-30	NP-10
	6-22	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
	22-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	80-95	60-80	25-40	5-15
Yawdim----------	0-6	Silty clay-------	CL, CH	A-7	0	100	100	90-100	85-95	40-60	20-40
	6-15	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	90-100	70-95	25-60	10-40
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
1----------------- Absher	0-7	27-40	0.06-0.2	0.12-0.16	6.6-8.4	4-8	Moderate	0.43	5	6	1-2
	7-11	35-60	<0.06	0.08-0.12	>7.8	8-16	High------	0.37			
	11-60	30-50	<0.06	0.04-0.10	>7.8	>8	High------	0.43			
2----------------- Adger	0-7	30-40	0.2-0.6	0.12-0.16	6.6-9.0	4-16	Moderate	0.43	5	4	1-3
	7-16	35-55	0.06-0.2	0.07-0.11	>7.8	>8	High------	0.43			
	16-60	25-40	0.06-0.2	0.06-0.10	>7.8	>8	High------	0.43			
3*:											
Adger-----------	0-7	30-40	0.2-0.6	0.12-0.16	6.6-9.0	4-16	Moderate	0.43	5	4	1-3
	7-16	35-55	0.06-0.2	0.07-0.11	>7.8	>8	High------	0.43			
	16-60	25-40	0.06-0.2	0.06-0.10	>7.8	>8	High------	0.43			
Absher----------	0-7	27-40	0.06-0.2	0.12-0.16	6.6-8.4	4-8	Moderate	0.43	5	6	1-2
	7-11	35-60	<0.06	0.08-0.12	>7.8	8-16	High------	0.37			
	11-60	30-50	<0.06	0.04-0.10	>7.8	>8	High------	0.43			
4. Aeric Fluvaquents											
5----------------- Alona	0-5	18-27	0.6-2.0	0.18-0.22	6.6-8.4	2-4	Low-------	0.37	5	6	1-3
	5-13	25-35	0.2-0.6	0.16-0.20	>7.8	2-4	Moderate	0.37			
	13-22	25-35	0.2-0.6	0.11-0.14	>8.4	2-8	Moderate	0.37			
	22-60	25-35	0.2-0.6	0.08-0.11	>9.0	>8	Moderate	0.43			
6----------------- Alona	0-5	18-27	0.6-2.0	0.15-0.19	7.9-8.4	4-8	Low-------	0.37	5	6	1-3
	5-22	25-35	0.2-0.6	0.11-0.15	>8.4	8-16	Moderate	0.43			
	22-60	25-35	0.2-0.6	0.08-0.11	>9.0	>8	Moderate	0.43			
7. Badland											
8----------------- Banks	0-16	5-15	2.0-6.0	0.12-0.16	6.6-7.8	<2	Low-------	0.20	5	3	.5-1
	16-60	0-10	6.0-20	0.06-0.09	7.4-8.4	<2	Low-------	0.20			
9----------------- Barkof	0-7	40-50	0.06-0.2	0.12-0.18	7.4-8.4	<2	High------	0.32	2	4	1-3
	7-29	45-60	0.06-0.2	0.12-0.18	7.9-9.0	2-4	High------	0.32			
	29	---	---	---	---	---	----------	----			
10---------------- Bascovy	0-2	40-60	<0.06	0.12-0.18	6.1-7.8	2-4	High------	0.37	2	4	1-2
	2-11	45-60	<0.06	0.12-0.18	6.1-7.8	2-4	High------	0.37			
	11-23	45-60	<0.06	0.11-0.17	6.1-7.8	2-8	High------	0.37			
	23	---	---	---	---	---	----------	----			
11*:											
Bascovy---------	0-2	40-60	<0.06	0.12-0.18	6.1-7.8	2-4	High------	0.37	2	4	1-2
	2-11	45-60	<0.06	0.12-0.18	6.1-7.8	2-4	High------	0.37			
	11-23	45-60	<0.06	0.11-0.17	6.1-7.8	2-8	High------	0.37			
	23	---	---	---	---	---	----------	----			
Sunburst--------	0-3	30-40	0.06-0.2	0.14-0.18	7.4-8.4	<2	Moderate	0.32	5	4L	1-3
	3-19	35-50	0.06-0.2	0.12-0.16	7.9-8.4	2-4	High------	0.24			
	19-60	35-50	0.06-0.2	0.12-0.16	7.9-9.0	2-8	High------	0.24			
12---------------- Benz	0-7	27-35	0.06-0.2	0.12-0.16	>7.3	4-8	Moderate	0.37	5	6	1-2
	7-60	18-35	0.06-0.2	0.08-0.12	>8.4	>8	Moderate	0.37			
13---------------- Bowbells	0-10	18-27	0.6-2.0	0.17-0.24	6.1-7.3	<2	Low-------	0.28	5	6	2-4
	10-28	20-35	0.6-2.0	0.16-0.22	6.6-7.8	<2	Moderate	0.28			
	28-60	20-35	0.2-0.6	0.14-0.18	7.9-8.4	<2	Moderate	0.37			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
14, 15----------- Bryant	0-4	18-26	0.6-2.0	0.18-0.20	6.1-7.3	<2	Low--------	0.32	5	6	2-4
	4-14	22-35	0.6-2.0	0.19-0.22	6.6-8.4	<2	Low--------	0.43			
	14-60	22-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low--------	0.43			
16*:											
Bryant----------	0-4	18-26	0.6-2.0	0.18-0.20	6.1-7.3	<2	Low--------	0.32	5	6	2-4
	4-14	22-35	0.6-2.0	0.19-0.22	6.6-8.4	<2	Low--------	0.43			
	14-60	22-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low--------	0.43			
Cambert---------	0-4	18-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	3	6	1-3
	4-13	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	13-21	18-35	0.6-2.0	0.16-0.20	7.4-9.0	<4	Moderate	0.32			
	21	---	---	---	---	---	-----------	----			
17--------------- Bryant Variant	0-10	18-27	0.6-2.0	0.11-0.14	7.4-8.4	>8	Low--------	0.37	5	6	3-5
	10-42	18-35	0.6-2.0	0.10-0.13	7.9-9.0	>8	Low--------	0.32			
	42-60	25-35	0.6-2.0	0.11-0.14	7.9-9.0	4-16	Moderate	0.32			
18, 19----------- Busby	0-5	10-18	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.24	5	3	1-2
	5-11	10-22	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.37			
	11-60	10-18	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low--------	0.20			
20*:											
Busby-----------	0-5	10-18	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.24	5	3	1-2
	5-11	10-22	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.37			
	11-60	10-18	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low--------	0.20			
Fleak-----------	0-7	0-15	6.0-20	0.06-0.12	6.6-8.4	<2	Low--------	0.17	2	2	<1
	7-16	0-15	6.0-20	0.06-0.10	6.6-8.4	<2	Low--------	0.17			
	16	---	---	---	---	---	-----------	----			
21*:											
Busby-----------	0-5	10-18	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.24	5	3	1-2
	5-11	10-22	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.37			
	11-60	10-18	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low--------	0.20			
Twilight--------	0-5	15-20	2.0-6.0	0.10-0.14	6.6-7.8	<2	Low--------	0.24	3	3	1-2
	5-25	10-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low--------	0.24			
	25	---	---	---	---	---	-----------	----			
22*:											
Busby-----------	0-5	10-18	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.24	5	3	1-2
	5-11	10-22	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.37			
	11-60	10-18	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low--------	0.20			
Twilight--------	0-5	15-20	2.0-6.0	0.10-0.14	6.6-7.8	<2	Low--------	0.24	3	3	1-2
	5-25	10-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low--------	0.24			
	25	---	---	---	---	---	-----------	----			
Fleak-----------	0-7	10-18	2.0-6.0	0.10-0.16	6.6-7.8	<2	Low--------	0.24	2	3	<1
	7-16	0-15	6.0-20	0.06-0.10	6.6-8.4	<2	Low--------	0.17			
	16	---	---	---	---	---	-----------	----			
23*:											
Busby-----------	0-5	10-18	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.24	5	3	1-2
	5-11	10-22	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low--------	0.37			
	11-60	10-18	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low--------	0.20			
Yamac-----------	0-4	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	4L	1-2
	4-11	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	11-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
Fleak-----------	0-7	10-18	2.0-6.0	0.10-0.16	6.6-7.8	<2	Low--------	0.24	2	3	<1
	7-16	0-15	6.0-20	0.06-0.10	6.6-8.4	<2	Low--------	0.17			
	16	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
24*:											
Busby	0-5	10-18	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low	0.24	5	3	1-2
	5-11	10-22	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low	0.37			
	11-60	10-18	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low	0.20			
Yetull	0-6	0-10	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	0.20	5	3	1-2
	6-60	0-10	6.0-20	0.05-0.07	7.4-8.4	<4	Low	0.17			
25	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low	0.37	2	4L	1-3
Cabba	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	---	---			
26*:											
Cabba	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	---	---			
Badland.											
27*:											
Cabba	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	---	---			
Barkof	0-7	40-50	0.06-0.2	0.12-0.18	7.4-8.4	<2	High	0.32	2	4	3-6
	7-29	45-60	0.06-0.2	0.12-0.18	7.9-9.0	2-4	High	0.32			
	29	---	---	---	---	---	---	---			
28*:											
Cabba	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	---	---			
Brandenburg	0-5	10-20	0.6-2.0	0.18-0.20	6.6-7.8	<2	Low	0.24	1	5	1-3
	5-10	10-20	0.6-2.0	0.14-0.17	6.6-7.8	<2	Low	0.20			
	10-60	0	>20	0.01-0.03	6.6-7.8	<2	Low	0.10			
29*:											
Cabba	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	---	---			
Dast	0-3	2-10	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.20	3	3	1-2
	3-25	2-10	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.20			
	25	---	---	---	---	---	---	---			
30*:											
Cabba	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	---	---			
Wabek	0-7	5-15	2.0-6.0	0.13-0.15	6.6-7.8	<2	Low	0.20	2	3	1-2
	7-60	0-10	>20	0.02-0.04	7.4-7.8	<2	Low	0.10			
Dast	0-3	2-10	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.20	3	3	1-2
	3-25	2-10	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.20			
	25	---	---	---	---	---	---	---			
31	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
Cabbart	4-13	15-35	0.6-2.0	0.15-0.19	7.4-8.4	2-8	Moderate	0.37			
	13	---	---	---	---	---	---	---			
32*:											
Cabbart	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
	4-13	15-35	0.6-2.0	0.15-0.19	7.4-8.4	2-8	Moderate	0.37			
	13	---	---	---	---	---	---	---			
Badland.											

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
33*:											
Cabbart----------	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low--------	0.37	2	4L	1-2
	4-13	15-35	0.6-2.0	0.15-0.19	7.4-8.4	2-8	Moderate	0.37			
	13	---	---	---	---	---	-----------	----			
Kirby------------	0-5	10-22	2.0-6.0	0.07-0.10	7.4-8.4	<2	Low--------	0.10	1	7	1-2
	5-18	8-22	6.0-20	0.03-0.06	7.9-8.4	<2	Low--------	0.05			
	18-60	0-1	>20	0.-0.01	7.9-8.4	<2	Low--------	0.00			
34*:											
Cabbart----------	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low--------	0.37	2	4L	1-2
	4-13	15-35	0.6-2.0	0.15-0.19	7.4-8.4	2-8	Moderate	0.37			
	13	---	---	---	---	---	-----------	----			
Twilight---------	0-5	15-20	2.0-6.0	0.10-0.14	6.6-7.8	<2	Low--------	0.24	3	3	1-2
	5-25	10-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low--------	0.24			
	25	---	---	---	---	---	-----------	----			
35*, 36*:											
Cabbart----------	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low--------	0.37	2	4L	1-2
	4-13	15-35	0.6-2.0	0.15-0.19	7.4-8.4	2-8	Moderate	0.37			
	13	---	---	---	---	---	-----------	----			
Yawdim-----------	0-6	40-50	0.06-0.2	0.15-0.18	7.4-7.8	<2	High-------	0.32	1	4	1-2
	6-15	35-50	0.06-0.2	0.14-0.20	7.9-8.4	<2	High-------	0.32			
	15	---	---	---	---	---	-----------	----			
37---------------- Cambert	0-4	18-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	3	6	1-3
	4-13	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	13-21	18-35	0.6-2.0	0.16-0.20	7.4-9.0	<4	Moderate	0.32			
	21	---	---	---	---	---	-----------	----			
38*:											
Cambert----------	0-4	18-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	3	6	1-3
	4-13	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	13-21	18-35	0.6-2.0	0.16-0.20	7.4-9.0	<4	Moderate	0.32			
	21	---	---	---	---	---	-----------	----			
Barkof-----------	0-7	40-50	0.06-0.2	0.12-0.18	7.4-8.4	<2	High-------	0.32	2	4	1-3
	7-29	45-60	0.06-0.2	0.12-0.18	7.9-9.0	2-4	High-------	0.32			
	29	---	---	---	---	---	-----------	----			
Cabba------------	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low--------	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	-----------	----			
39*:											
Cambert----------	0-4	18-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	3	6	1-3
	4-13	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	13-21	18-35	0.6-2.0	0.16-0.20	7.4-9.0	<4	Moderate	0.32			
	21	---	---	---	---	---	-----------	----			
Cabba------------	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low--------	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	-----------	----			
40*:											
Cambert----------	0-4	18-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	3	6	1-3
	4-13	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	13-21	18-35	0.6-2.0	0.16-0.20	7.4-9.0	<4	Moderate	0.32			
	21	---	---	---	---	---	-----------	----			
Dast-------------	0-3	2-10	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low--------	0.20	3	3	1-2
	3-25	2-10	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low--------	0.20			
	25	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
40*:											
Cabba-----------	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low--------	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	----------	----			
41--------------- Cambeth	0-6	18-27	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low--------	0.37	3	6	1-2
	6-11	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	11-35	18-35	0.6-2.0	0.15-0.19	7.9-9.0	2-4	Moderate	0.32			
	35	---	---	---	---	---	----------	----			
42*:											
Cambeth---------	0-6	18-27	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low--------	0.37	3	6	1-2
	6-11	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	11-35	18-35	0.6-2.0	0.15-0.19	7.9-9.0	2-4	Moderate	0.32			
	35	---	---	---	---	---	----------	----			
Cabbart---------	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low--------	0.37	2	4L	1-2
	4-13	15-35	0.6-2.0	0.15-0.19	7.4-8.4	2-8	Moderate	0.37			
	13	---	---	---	---	---	----------	----			
43*:											
Cambeth---------	0-6	18-27	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low--------	0.37	3	6	1-2
	6-11	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	11-35	18-35	0.6-2.0	0.15-0.19	7.9-9.0	2-4	Moderate	0.32			
	35	---	---	---	---	---	----------	----			
Twilight--------	0-5	15-20	2.0-6.0	0.10-0.14	6.6-7.8	<2	Low--------	0.24	3	3	1-2
	5-25	10-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low--------	0.24			
	25	---	---	---	---	---	----------	----			
Cabbart---------	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low--------	0.37	2	4L	1-2
	4-13	15-35	0.6-2.0	0.15-0.19	7.4-8.4	2-8	Moderate	0.37			
	13	---	---	---	---	---	----------	----			
44--------------- Cherry	0-3	18-27	0.6-2.0	0.20-0.24	6.6-8.4	<2	Moderate	0.37	5	6	1-3
	3-60	18-35	0.2-0.6	0.16-0.22	7.9-9.0	<2	Moderate	0.37			
45*:											
Cherry----------	0-3	18-27	0.6-2.0	0.20-0.24	6.6-8.4	<2	Moderate	0.37	5	6	1-3
	3-60	18-35	0.2-0.6	0.16-0.22	7.9-9.0	<2	Moderate	0.37			
Havrelon--------	0-5	15-25	0.6-2.0	0.16-0.20	7.4-7.8	<2	Moderate	0.32	5	4L	1-3
	5-60	18-30	0.6-2.0	0.15-0.19	7.4-7.8	<2	Moderate	0.32			
Trembles--------	0-6	10-20	2.0-6.0	0.12-0.16	6.6-8.4	<2	Low--------	0.20	5	3	1-3
	6-16	8-15	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low--------	0.20			
	16-60	8-15	2.0-6.0	0.10-0.14	7.4-9.0	<2	Low--------	0.20			
46, 47, 48, 49--- Chinook	0-6	5-18	2.0-6.0	0.12-0.16	6.6-8.4	<2	Low--------	0.20	5	3	1-2
	6-29	5-18	2.0-6.0	0.11-0.15	6.6-9.0	<2	Low--------	0.20			
	29-60	5-15	2.0-6.0	0.08-0.12	7.4-9.0	<2	Low--------	0.20			
50--------------- Creed	0-8	18-27	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low--------	0.37	5	6	1-3
	8-24	35-55	0.06-0.2	0.10-0.14	7.9-9.0	4-8	High-------	0.28			
	24-60	27-45	0.06-0.2	0.08-0.12	7.9-9.0	4-16	Moderate	0.32			
51*:											
Creed-----------	0-8	18-27	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low--------	0.37	5	6	1-3
	8-24	35-55	0.06-0.2	0.10-0.14	7.9-9.0	4-8	High-------	0.28			
	24-60	27-45	0.06-0.2	0.08-0.12	7.9-9.0	4-16	Moderate	0.32			
Gerdrum---------	0-7	27-40	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.37	5	6	1-3
	7-11	35-55	0.06-0.2	0.10-0.14	7.4-9.0	2-8	High-------	0.32			
	11-60	30-50	0.06-0.2	0.07-0.11	7.9-9.0	8-16	High-------	0.37			
52, 53----------- Dast	0-3	2-10	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low--------	0.20	3	3	1-2
	3-25	2-10	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low--------	0.20			
	25	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
54*, 55*:											
Dast	0-3	2-10	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.20	3	3	1-2
	3-25	2-10	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.20			
	25	---	---	---	---	---	---	---			
Blanchard	0-7	0-5	6.0-20	0.06-0.09	5.6-7.8	<2	Low	0.17	5	2	.5-1
	7-60	0-5	6.0-20	0.06-0.08	6.6-7.8	<2	Low	0.17			
56 Dimmick	0-7	40-50	<0.2	0.14-0.18	6.6-7.8	<2	High	0.28	5	8	2-6
	7-60	40-60	<0.06	0.13-0.17	7.4-8.4	<2	High	0.28			
57 Dimmick	0-7	40-50	<0.2	0.14-0.18	6.6-7.8	<2	High	0.28	5	4	2-5
	7-60	40-60	<0.06	0.13-0.17	7.4-8.4	2-8	High	0.28			
58, 59 Ethridge	0-3	32-40	0.2-0.6	0.16-0.20	6.1-7.8	<2	Moderate	0.37	5	4	1-3
	3-11	35-45	0.06-0.2	0.12-0.16	6.6-8.4	<2	High	0.32			
	11-60	30-45	0.06-0.2	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
60 Evanston	0-8	20-27	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.37	5	6	1-3
	8-26	25-35	0.6-2.0	0.12-0.18	6.6-7.8	<2	Moderate	0.37			
	26-60	15-30	0.6-2.0	0.16-0.18	7.9-9.0	<4	Moderate	0.37			
61 Evanston	0-8	20-27	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.37	5	6	1-3
	8-26	25-35	0.6-2.0	0.12-0.18	6.6-7.8	<2	Moderate	0.37			
	26-61	15-30	0.6-2.0	0.16-0.18	7.9-9.0	<4	Moderate	0.37			
62*:											
Evanston	0-8	20-27	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.37	5	6	1-3
	8-26	25-35	0.6-2.0	0.12-0.18	6.6-7.8	<2	Moderate	0.37			
	26-60	15-30	0.6-2.0	0.16-0.18	7.9-9.0	<4	Moderate	0.37			
Gerdrum	0-7	27-40	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.37	5	6	1-3
	7-11	35-55	0.06-0.2	0.10-0.14	7.4-9.0	2-8	High	0.32			
	11-60	30-50	0.06-0.2	0.07-0.11	7.9-9.0	8-16	High	0.37			
63 Farland	0-4	15-25	0.6-2.0	0.19-0.21	6.1-7.8	<2	Low	0.37	5	6	2-4
	4-15	27-35	0.6-2.0	0.16-0.20	6.6-7.8	<2	Moderate	0.32			
	15-60	20-35	0.6-2.0	0.17-0.20	6.6-8.4	<4	Moderate	0.32			
64 Farnuf	0-6	15-27	0.6-2.0	0.16-0.20	6.1-7.8	<2	Low	0.37	5	6	2-4
	6-15	25-35	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32			
	15-60	20-30	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
65, 66 Floweree	0-6	18-27	0.6-2.0	0.18-0.22	6.6-8.4	<2	Low	0.37	5	6	1-2
	6-10	20-35	0.2-0.6	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	10-60	20-35	0.2-0.6	0.15-0.19	7.9-9.0	2-4	Moderate	0.32			
67*:											
Floweree	0-6	18-27	0.6-2.0	0.18-0.22	6.6-8.4	<2	Low	0.37	5	6	1-2
	6-10	20-35	0.2-0.6	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	10-60	20-35	0.2-0.6	0.15-0.19	7.9-9.0	2-4	Moderate	0.32			
Cambeth	0-6	18-27	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low	0.37	3	6	1-2
	6-11	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	11-35	18-35	0.6-2.0	0.15-0.19	7.9-9.0	2-4	Moderate	0.32			
	35	---	---	---	---	---	---	---			
68, 69 Gerdrum	0-7	27-40	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.37	5	6	1-3
	7-11	35-55	0.06-0.2	0.10-0.14	7.4-9.0	2-8	High	0.32			
	11-60	30-50	0.06-0.2	0.07-0.11	7.9-9.0	8-16	High	0.37			
70*:											
Gerdrum	0-7	27-40	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.37	5	6	1-3
	7-11	35-55	0.06-0.2	0.10-0.14	7.4-9.0	2-8	High	0.32			
	11-60	30-50	0.06-0.2	0.07-0.11	7.9-9.0	8-16	High	0.37			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
70*:											
Absher----------	0-7	27-40	0.06-0.2	0.12-0.16	6.6-8.4	4-8	Moderate	0.43	5	6	1-2
	7-11	35-60	<0.06	0.08-0.12	>7.8	8-16	High------	0.37			
	11-60	30-50	<0.06	0.04-0.10	>7.8	>8	High------	0.43			
71*, 72*:											
Gerdrum---------	0-7	27-40	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.37	5	6	1-3
	7-11	35-55	0.06-0.2	0.10-0.14	7.4-9.0	2-8	High------	0.32			
	11-60	30-50	0.06-0.2	0.07-0.11	7.9-9.0	8-16	High------	0.37			
Yawdim----------	0-6	40-50	0.06-0.2	0.15-0.18	7.4-7.8	<2	High------	0.32	1	4	1-2
	6-15	35-50	0.06-0.2	0.14-0.20	7.9-8.4	<2	High------	0.32			
	15	---	---	---	---	---	----------	----			
Fleak-----------	0-7	10-18	2.0-6.0	0.10-0.16	6.6-7.8	<2	Low-------	0.24	2	3	<1
	7-16	0-15	6.0-20	0.06-0.10	6.6-8.4	<2	Low-------	0.17			
	16	---	---	---	---	---	----------	----			
73--------------- Glendive	0-6	5-15	2.0-6.0	0.12-0.18	7.4-8.4	<4	Low-------	0.20	5	3	.5-2
	6-60	5-18	2.0-6.0	0.10-0.16	7.4-9.0	2-8	Low-------	0.20			
74--------------- Glendive	0-6	10-18	0.6-2.0	0.14-0.20	7.4-8.4	<4	Low-------	0.32	5	5	.5-2
	6-60	5-18	2.0-6.0	0.10-0.16	7.4-9.0	2-8	Low-------	0.20			
75--------------- Glendive	0-6	10-20	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low-------	0.32	5	4L	.5-2
	6-60	5-18	2.0-6.0	0.10-0.14	7.4-9.0	2-8	Low-------	0.28			
76--------------- Glendive	0-6	27-35	0.6-2.0	0.14-0.20	7.4-8.4	<4	Low-------	0.32	5	5	.5-2
	6-60	5-18	2.0-6.0	0.10-0.16	7.4-9.0	2-8	Low-------	0.20			
77--------------- Glendive	0-6	27-35	0.6-2.0	0.16-0.20	7.4-8.4	<4	Moderate	0.28	5	4L	.5-2
	6-60	5-18	2.0-6.0	0.10-0.14	7.4-9.0	2-8	Low-------	0.28			
78*:											
Glendive--------	0-6	5-15	2.0-6.0	0.12-0.16	7.4-8.4	<4	Low-------	0.20	5	3	.5-2
	6-60	5-18	2.0-6.0	0.10-0.14	7.4-9.0	2-8	Low-------	0.28			
Hanly-----------	0-4	0-10	6.0-20	0.08-0.12	6.6-8.4	<2	Low-------	0.17	5	2	<1
	4-60	0-12	6.0-20	0.06-0.09	6.6-8.4	<2	Low-------	0.17			
79--------------- Hanly	0-4	0-10	6.0-20	0.08-0.12	6.6-8.4	<2	Low-------	0.17	5	2	<1
	4-60	0-12	6.0-20	0.06-0.09	6.6-8.4	<2	Low-------	0.17			
80, 81----------- Harlem	0-5	40-55	0.06-0.2	0.14-0.18	7.4-8.4	<4	High------	0.32	5	4	.5-1
	5-60	35-60	0.06-0.2	0.14-0.18	7.4-8.4	<4	High------	0.37			
82, 83----------- Havre	0-5	15-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low-------	0.37	5	4L	.5-2
	5-60	18-35	0.6-2.0	0.14-0.18	7.4-8.4	<8	Low-------	0.28			
84, 85----------- Havre	0-9	27-40	0.2-0.6	0.14-0.18	7.4-8.4	<4	Moderate	0.32	5	4L	.5-2
	9-60	18-35	0.6-2.0	0.14-0.18	7.4-8.4	<8	Low-------	0.28			
86, 87----------- Havrelon	0-5	15-25	0.6-2.0	0.20-0.24	7.4-7.8	<2	Moderate	0.32	5	4L	1-2
	5-60	18-30	0.6-2.0	0.15-0.19	7.4-7.8	<2	Moderate	0.32			
88--------------- Havrelon	0-5	20-27	0.6-2.0	0.13-0.17	7.4-7.8	<4	Moderate	0.37	5	6	1-2
	5-60	18-35	0.6-2.0	0.09-0.13	>7.8	8-16	Moderate	0.28			
89, 90----------- Havrelon	0-6	15-25	0.6-2.0	0.20-0.24	7.4-7.8	<2	Moderate	0.32	5	4L	1-2
	6-60	18-30	0.6-2.0	0.15-0.19	7.4-7.8	<2	Moderate	0.32			
91, 92, 93------- Hillon	0-7	20-27	0.6-2.0	0.18-0.20	7.4-8.4	<2	Low-------	0.37	5	4L	.5-2
	7-60	20-35	0.06-0.2	0.15-0.18	7.9-9.0	<2	Moderate	0.32			
94*:											
Hillon----------	0-7	20-27	0.6-2.0	0.18-0.20	7.4-8.4	<2	Low-------	0.37	5	4L	.5-2
	7-60	20-35	0.06-0.2	0.15-0.18	7.9-9.0	<2	Moderate	0.32			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
94*:											
Badland.											
95*:											
Hillon----------	0-7	20-27	0.6-2.0	0.18-0.20	7.4-8.4	<2	Low--------	0.37	5	4L	.5-2
	7-60	20-35	0.06-0.2	0.15-0.18	7.9-9.0	<2	Moderate	0.32			
Yamac-----------	0-4	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	4L	1-2
	4-11	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	11-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
Fleak-----------	0-7	10-18	2.0-6.0	0.10-0.16	6.6-7.8	<2	Low--------	0.24	2	3	<1
	7-16	0-15	6.0-20	0.06-0.10	6.6-8.4	<2	Low--------	0.17			
	16	---	---	---	---	---	----------	----			
96--------------- Hoffmanville	0-5	40-50	0.06-0.2	0.14-0.18	6.6-8.4	<2	High-------	0.32	3	4L	1-2
	5-28	35-50	0.06-0.2	0.13-0.17	6.6-8.4	<2	High-------	0.32			
	28-60	0-10	6.0-20	0.06-0.08	6.6-8.4	<2	Low--------	0.17			
97, 98----------- Kremlin	0-6	18-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low--------	0.37	5	6	1-3
	6-10	18-30	0.6-2.0	0.16-0.20	6.6-7.8	<2	Moderate	0.37			
	10-18	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	18-60	10-25	0.6-2.0	0.14-0.18	7.4-9.0	<4	Low--------	0.37			
99--------------- Lehr	0-4	10-27	2.0-6.0	0.17-0.22	6.6-7.3	<2	Low--------	0.28	3	5	1-3
	4-18	18-30	2.0-6.0	0.17-0.20	6.6-8.4	<2	Moderate	0.28			
	18-60	0-10	>20	0.02-0.04	7.4-8.4	<2	Low--------	0.10			
100, 101--------- Lisk	0-5	5-18	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low--------	0.20	5	3	1-3
	5-15	5-18	2.0-6.0	0.11-0.15	7.9-8.4	<2	Low--------	0.20			
	15-41	5-18	2.0-6.0	0.10-0.14	7.9-8.4	<2	Low--------	0.20			
	41-60	0-10	2.0-6.0	0.07-0.10	7.9-8.4	<2	Low--------	0.17			
102-------------- Lohler	0-6	20-40	0.2-0.6	0.18-0.24	7.4-8.4	<2	Moderate	0.28	5	6	.5-2
	6-60	35-50	0.06-0.2	0.13-0.17	7.4-8.4	<2	High-------	0.28			
103, 104--------- Lohler	0-5	40-50	0.06-0.6	0.15-0.18	7.4-8.4	<2	High-------	0.28	5	4	.5-2
	5-60	35-50	0.06-0.2	0.13-0.17	7.4-8.4	<2	High-------	0.28			
105-------------- Lonna	0-7	27-35	0.6-2.0	0.16-0.20	6.6-8.4	<2	Moderate	0.32	5	4L	1-3
	7-12	18-35	0.6-2.0	0.16-0.20	6.6-8.4	<2	Moderate	0.37			
	12-60	18-35	0.6-2.0	0.16-0.20	7.9-9.0	<4	Moderate	0.37			
106*:											
Lonna-----------	0-7	27-35	0.6-2.0	0.16-0.20	6.6-8.4	<2	Moderate	0.32	5	4L	1-3
	7-12	18-35	0.6-2.0	0.16-0.20	6.6-8.4	<2	Moderate	0.37			
	12-60	18-35	0.6-2.0	0.16-0.20	7.9-9.0	<4	Moderate	0.37			
Havre-----------	0-5	10-22	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low--------	0.37	5	4L	.5-2
	5-60	18-30	0.6-2.0	0.14-0.18	7.4-8.4	<2	Low--------	0.28			
Glendive--------	0-6	5-15	2.0-6.0	0.12-0.18	7.4-9.0	<4	Low--------	0.20	5	3	.5-2
	6-60	5-18	2.0-6.0	0.10-0.16	7.4-9.0	2-8	Low--------	0.20			
107, 108, 109---- Macar	0-3	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	6	1-3
	3-34	18-35	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	34-60	15-30	0.6-2.0	0.13-0.17	7.4-9.0	<2	Moderate	0.32			
110-------------- Macar	0-7	18-27	0.6-2.0	0.16-0.20	7.9-8.4	<2	Low--------	0.37	5	4L	1-3
	7-20	18-35	0.6-2.0	0.12-0.16	8.5-9.0	4-8	Moderate	0.37			
	20-60	18-35	0.6-2.0	0.10-0.13	8.5-9.0	8-16	Moderate	0.37			
111*:											
Macar-----------	0-3	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	6	1-3
	3-34	18-35	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	34-60	15-30	0.6-2.0	0.13-0.17	7.4-9.0	<2	Moderate	0.32			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
111*:											
Cabba-----------	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low--------	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	----------	----			
112*:											
Macar-----------	0-3	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	6	1-3
	3-34	18-35	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	34-60	15-30	0.6-2.0	0.13-0.17	7.4-9.0	<2	Moderate	0.32			
Cambert---------	0-4	18-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	3	6	1-3
	4-13	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	13-21	18-35	0.6-2.0	0.16-0.20	7.4-9.0	<4	Moderate	0.32			
	21	---	---	---	---	---	----------	----			
113-------------- Marias	0-7	40-60	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High------	0.37	5	4	.5-2
	7-33	45-60	<0.06	0.12-0.16	7.4-8.4	2-4	High------	0.37			
	33-60	45-60	<0.06	0.12-0.16	7.4-8.4	2-8	High------	0.37			
114-------------- Marvan	0-4	40-60	0.06-0.2	0.14-0.18	7.4-8.4	<4	High------	0.37	5	4	.5-1
	4-35	45-60	<0.06	0.10-0.14	7.9-9.0	2-8	High------	0.37			
	35-60	30-50	<0.06	0.08-0.11	7.9-9.0	8-16	High------	0.37			
115*:											
Neldore---------	0-3	40-50	0.06-0.2	0.14-0.18	6.6-7.3	<2	High------	0.32	1	4	1-3
	3-16	40-60	0.06-0.2	0.12-0.16	5.6-7.3	<4	High------	0.32			
	16	---	---	---	---	---	----------	----			
Badland.											
Bascovy---------	0-2	40-60	<0.06	0.12-0.18	6.1-7.8	2-4	High------	0.37	2	4	1-2
	2-11	45-60	<0.06	0.12-0.18	6.1-7.8	2-4	High------	0.37			
	11-23	45-60	<0.06	0.11-0.17	6.1-7.8	2-8	High------	0.37			
	23	---	---	---	---	---	----------	----			
116*:											
Neldore---------	0-3	40-50	0.06-0.2	0.14-0.18	6.6-7.3	<2	High------	0.32	1	4	1-3
	3-16	40-60	0.06-0.2	0.12-0.16	5.6-7.3	<4	High------	0.32			
	16	---	---	---	---	---	----------	----			
Bascovy---------	0-2	40-60	<0.06	0.12-0.18	6.1-7.8	2-4	High------	0.37	2	4	1-2
	2-11	45-60	<0.06	0.12-0.18	6.1-7.8	2-4	High------	0.37			
	11-23	45-60	<0.06	0.11-0.17	6.1-7.8	2-8	High------	0.37			
	23	---	---	---	---	---	----------	----			
117*:											
Neldore---------	0-3	40-50	0.06-0.2	0.14-0.18	6.6-7.3	<2	High------	0.32	1	4	1-3
	3-16	40-60	0.06-0.2	0.12-0.16	5.6-7.3	<4	High------	0.32			
	16	---	---	---	---	---	----------	----			
Yamac-----------	0-4	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	4L	1-2
	4-11	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	11-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
Badland.											
118-------------- Pendroy	0-14	60-75	<0.06	0.14-0.18	6.6-8.4	2-4	High------	0.37	5	4	.5-1
	14-47	60-75	<0.06	0.13-0.17	7.4-8.4	2-4	High------	0.37			
	47-60	50-65	<0.06	0.12-0.16	7.4-8.4	2-4	High------	0.37			
119-------------- Ridgelawn	0-7	18-27	0.6-2.0	0.18-0.22	7.4-8.4	<2	Low--------	0.37	3	4L	1-2
	7-24	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	24-60	0-10	6.0-20	0.06-0.09	7.4-8.4	<2	Low--------	0.15			
120, 121--------- Rominell	0-4	15-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.43	5	5	1-3
	4-9	10-27	0.6-2.0	0.13-0.17	7.4-8.4	<2	Low--------	0.43			
	9-25	20-35	0.06-0.2	0.11-0.15	>8.4	2-8	Moderate	0.37			
	25-60	10-32	0.06-0.2	0.10-0.14	>8.4	2-8	Low--------	0.37			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
122*:											
Rominell--------	0-4	15-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low-------	0.43	5	5	1-3
	4-9	10-27	0.6-2.0	0.13-0.17	7.4-8.4	<2	Low-------	0.43			
	9-25	20-35	0.06-0.2	0.11-0.15	>8.4	2-8	Moderate	0.37			
	25-60	10-32	0.06-0.2	0.10-0.14	>8.4	2-8	Low-------	0.37			
Yamac-----------	0-4	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low-------	0.37	5	5	1-2
	4-11	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	11-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
123-------------- Savage	0-7	27-35	0.6-2.0	0.16-0.20	6.6-7.8	<2	Moderate	0.37	5	7	2-4
	7-28	35-45	0.06-0.2	0.14-0.18	6.6-8.4	2-8	High------	0.32			
	28-60	30-45	0.06-0.2	0.13-0.17	7.4-8.4	2-8	High------	0.32			
124, 125--------- Shambo	0-4	10-27	0.6-2.0	0.20-0.22	6.6-7.3	<2	Low-------	0.28	5	6	2-4
	4-14	18-30	0.6-2.0	0.17-0.19	6.6-8.4	<2	Moderate	0.28			
	14-60	18-30	0.6-2.0	0.17-0.19	7.4-9.0	<2	Moderate	0.28			
126*:											
Shambo----------	0-4	10-27	0.6-2.0	0.20-0.22	6.6-7.3	<2	Low-------	0.28	5	6	2-4
	4-14	18-30	0.6-2.0	0.17-0.19	6.6-8.4	<2	Moderate	0.28			
	14-60	18-30	0.6-2.0	0.17-0.19	7.4-9.0	<2	Moderate	0.28			
Cabba-----------	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low-------	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	----------	----			
127*:											
Shambo----------	0-4	10-27	0.6-2.0	0.20-0.22	6.6-7.3	<2	Low-------	0.28	5	6	2-4
	4-14	18-30	0.6-2.0	0.17-0.19	6.6-8.4	<2	Moderate	0.28			
	14-60	18-30	0.6-2.0	0.17-0.19	7.4-9.0	<2	Moderate	0.28			
Cambert---------	0-4	18-25	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low-------	0.37	3	6	1-3
	4-13	18-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	13-21	18-35	0.6-2.0	0.16-0.20	7.4-9.0	<4	Moderate	0.32			
	21	---	---	---	---	---	----------	----			
128, 129, 130---- Sunburst	0-3	30-40	0.06-0.2	0.14-0.18	7.4-8.4	<2	Moderate	0.32	5	4L	1-3
	3-19	35-50	0.06-0.2	0.12-0.16	7.9-8.4	2-4	High------	0.24			
	19-60	35-50	0.06-0.2	0.12-0.16	7.9-9.0	2-8	High------	0.24			
131, 132--------- Tally	0-4	10-20	2.0-6.0	0.12-0.16	6.1-7.8	<2	Low-------	0.20	5	3	1-3
	4-20	5-18	2.0-6.0	0.12-0.16	6.6-8.4	<2	Low-------	0.20			
	20-31	5-15	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low-------	0.20			
	31-60	5-10	6.0-20	0.06-0.10	7.4-8.4	<2	Low-------	0.17			
133-------------- Telstad	0-4	18-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low-------	0.37	5	6	1-3
	4-13	25-35	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	13-22	20-32	0.2-0.6	0.14-0.18	7.9-8.4	2-4	Moderate	0.37			
	22-60	20-32	0.06-0.2	0.14-0.18	7.9-9.0	2-4	Moderate	0.43			
134*, 135*:											
Telstad---------	0-4	18-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low-------	0.37	5	6	1-3
	4-13	25-35	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	13-22	20-32	0.2-0.6	0.14-0.18	7.9-8.4	2-4	Moderate	0.37			
	22-60	20-32	0.06-0.2	0.14-0.18	7.9-9.0	2-4	Moderate	0.43			
Hillon----------	0-7	20-27	0.6-2.0	0.18-0.20	7.4-8.4	<2	Low-------	0.37	5	4L	.5-2
	7-60	20-35	0.06-0.2	0.15-0.18	7.9-9.0	<2	Moderate	0.32			
136*:											
Telstad---------	0-4	18-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low-------	0.37	5	6	1-3
	4-13	25-35	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	13-22	20-32	0.2-0.6	0.14-0.18	7.9-8.4	2-4	Moderate	0.37			
	22-60	20-32	0.06-0.2	0.14-0.18	7.9-9.0	2-4	Moderate	0.43			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
136*:											
Thoeny----------	0-6	15-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low--------	0.49	5	5	1-2
	6-31	35-50	<0.06	0.10-0.14	>7.8	4-8	Moderate	0.32			
	31-60	27-40	<0.06	0.10-0.14	>7.8	4-16	Moderate	0.32			
137-------------- Thoeny	0-6	15-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low--------	0.49	5	5	1-2
	6-31	35-50	<0.06	0.10-0.14	>7.8	4-8	Moderate	0.32			
	31-60	27-40	<0.06	0.10-0.14	>7.8	4-16	Moderate	0.32			
138*:											
Thoeny----------	0-6	15-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low--------	0.49	5	5	1-2
	6-31	35-50	<0.06	0.10-0.14	>7.8	4-8	Moderate	0.32			
	31-60	27-40	<0.06	0.10-0.14	>7.8	4-16	Moderate	0.32			
Absher----------	0-7	27-40	0.06-0.2	0.12-0.16	6.6-8.4	4-8	Moderate	0.43	5	6	1-2
	7-11	35-60	<0.06	0.08-0.12	>7.8	8-16	High------	0.37			
	11-60	30-50	<0.06	0.04-0.10	>7.8	>8	High------	0.43			
139, 140--------- Trembles	0-6	10-20	2.0-6.0	0.12-0.16	6.6-8.4	<2	Low--------	0.20	5	3	1-3
	6-16	8-15	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low--------	0.20			
	16-60	8-15	2.0-6.0	0.10-0.14	7.4-9.0	<2	Low--------	0.20			
141-------------- Turner	0-7	15-25	0.6-2.0	0.16-0.20	6.1-7.8	<2	Low--------	0.37	3	6	2-4
	7-33	25-35	0.6-2.0	0.12-0.16	6.6-8.4	<2	Moderate	0.28			
	33-60	0-5	6.0-20	0.01-0.04	7.4-8.4	<2	Low--------	0.05			
142*:											
Twilight--------	0-5	15-20	2.0-6.0	0.10-0.14	6.6-7.8	<2	Low--------	0.24	3	3	1-2
	5-25	10-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low--------	0.24			
	25	---	---	---	---	---	----------	----			
Yetull----------	0-6	0-10	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low--------	0.20	5	3	1-2
	6-60	0-10	6.0-20	0.05-0.07	7.4-8.4	<4	Low--------	0.17			
143, 144. Typic Fluvaquents											
145. Typic Ustifluvents											
146*: Typic Ustorthents.											
Typic Ustifluvents.											
147*: Ustic Torriorthents.											
Ustic Torrifluvents.											
148-------------- Vanda	0-2	40-60	<0.06	0.08-0.12	>7.8	>8	High------	0.37	5	4	.5-2
	2-60	35-60	<0.06	0.08-0.12	>7.8	>8	High------	0.37			
149, 150--------- Vida	0-7	27-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6	1-3
	7-19	25-35	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32			
	19-60	25-35	0.2-0.6	0.14-0.18	7.9-9.0	<2	Moderate	0.32			
151*, 152*:											
Vida------------	0-7	27-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6	1-3
	7-19	25-35	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32			
	19-60	25-35	0.2-0.6	0.14-0.18	7.9-9.0	<2	Moderate	0.32			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
151*, 152*:											
Zahill----------	0-6	20-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low--------	0.37	5	4L	.5-2
	6-22	25-35	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	22-60	25-35	0.2-0.6	0.14-0.18	7.4-9.0	<2	Moderate	0.32			
153, 154--------- Wabek	0-7	5-15	2.0-6.0	0.13-0.15	6.6-7.8	<2	Low--------	0.20	2	3	1-2
	7-60	0-10	>20	0.02-0.04	7.4-7.8	<2	Low--------	0.10			
155-------------- Weingart	0-7	40-45	<0.06	0.15-0.18	>7.3	<2	High-------	0.37	2	4	1-2
	7-21	40-60	<0.06	0.12-0.15	6.6-9.0	4-16	High-------	0.37			
	21-30	35-55	<0.06	0.10-0.14	7.9-9.0	8-16	High-------	0.37			
	30	---	---	---	---	---	-----------	----			
156, 157--------- Williams	0-8	15-27	0.6-2.0	0.17-0.24	6.6-7.8	<2	Low--------	0.28	5	6	2-4
	8-23	24-35	0.6-2.0	0.16-0.20	6.6-8.4	<2	Moderate	0.28			
	23-60	18-35	0.2-0.6	0.15-0.18	7.9-8.4	<2	Moderate	0.37			
158*:											
Williams--------	0-8	15-27	0.6-2.0	0.17-0.24	6.6-7.8	<2	Low--------	0.28	5	6	2-4
	8-23	24-35	0.6-2.0	0.16-0.20	6.6-8.4	<2	Moderate	0.28			
	23-60	18-35	0.2-0.6	0.15-0.18	7.9-8.4	<2	Moderate	0.37			
Vida------------	0-7	27-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6	1-3
	7-19	25-35	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32			
	19-60	25-35	0.2-0.6	0.14-0.18	7.9-9.0	<2	Moderate	0.32			
159, 160, 161---- Yamac	0-4	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	5	1-2
	4-11	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	11-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
162*:											
Yamac-----------	0-4	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	5	1-2
	4-11	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	11-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
Twilight--------	0-5	15-20	2.0-6.0	0.10-0.14	6.6-7.8	<2	Low--------	0.24	3	3	1-2
	5-25	10-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low--------	0.24			
	25	---	---	---	---	---	-----------	----			
163*:											
Yamac-----------	0-4	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low--------	0.37	5	5	1-2
	4-11	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	11-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
Twilight--------	0-5	15-20	2.0-6.0	0.10-0.14	6.6-7.8	<2	Low--------	0.24	3	3	1-2
	5-25	10-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low--------	0.24			
	25	---	---	---	---	---	-----------	----			
Fleak-----------	0-7	10-18	2.0-6.0	0.10-0.16	6.6-7.8	<2	Low--------	0.24	2	3	<1
	7-16	0-15	6.0-20	0.06-0.10	6.6-8.4	<2	Low--------	0.17			
	16	---	---	---	---	---	-----------	----			
164-------------- Yawdim	0-6	40-50	0.06-0.2	0.15-0.18	7.4-7.8	<2	High-------	0.32	1	4	1-2
	6-15	35-50	0.06-0.2	0.14-0.20	7.9-8.4	<2	High-------	0.32			
	15	---	---	---	---	---	-----------	----			
165*:											
Yawdim----------	0-6	40-50	0.06-0.2	0.15-0.18	7.4-7.8	<2	High-------	0.32	1	4	1-2
	6-15	35-50	0.06-0.2	0.14-0.20	7.9-8.4	<2	High-------	0.32			
	15	---	---	---	---	---	-----------	----			
Badland.											
Cabbart---------	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low--------	0.37	2	4L	1-2
	4-13	15-35	0.6-2.0	0.15-0.19	7.4-8.4	2-8	Moderate	0.37			
	13	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
166*:											
Yawdim----------	0-6	40-50	0.06-0.2	0.15-0.18	7.4-7.8	<2	High------	0.32	1	4	1-2
	6-15	35-50	0.06-0.2	0.14-0.20	7.9-8.4	<2	High------	0.32			
	15	---	---	---	---	---	----------	----			
Badland.											
Gerdrum---------	0-7	27-40	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.37	5	6	1-3
	7-11	35-55	0.06-0.2	0.10-0.14	7.4-9.0	2-8	High------	0.32			
	11-60	30-50	0.06-0.2	0.07-0.11	7.9-9.0	8-16	High------	0.37			
167*:											
Yawdim----------	0-6	40-50	0.06-0.2	0.15-0.18	7.4-7.8	<2	High------	0.32	1	4	1-2
	6-15	35-50	0.06-0.2	0.14-0.20	7.9-8.4	<2	High------	0.32			
	15	---	---	---	---	---	----------	----			
Kirby-----------	0-5	10-22	2.0-6.0	0.07-0.10	7.4-8.4	<2	Low-------	0.10	1	7	1-2
	5-18	8-22	6.0-20	0.03-0.06	7.9-8.4	<2	Low-------	0.05			
	18-60	0-1	>20	0.-0.01	7.9-8.4	<2	Low-------	0.00			
168, 169, 170---- Zahill	0-6	20-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-------	0.37	5	4L	.5-2
	6-22	25-35	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	22-60	25-35	0.2-0.6	0.14-0.18	7.4-9.0	<2	Moderate	0.32			
171*:											
Zahill----------	0-6	20-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-------	0.37	5	4L	.5-2
	6-22	25-35	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	22-60	25-35	0.2-0.6	0.14-0.18	7.4-9.0	<2	Moderate	0.32			
Badland.											
172*, 173*:											
Zahill----------	0-6	20-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-------	0.37	5	4L	.5-2
	6-22	25-35	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	22-60	25-35	0.2-0.6	0.14-0.18	7.4-9.0	<2	Moderate	0.32			
Cabba-----------	0-5	10-27	0.6-2.0	0.16-0.20	7.4-8.4	<4	Low-------	0.37	2	4L	1-3
	5-15	20-35	0.6-2.0	0.14-0.18	7.9-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	----------	----			
174*:											
Zahill----------	0-6	20-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-------	0.37	5	4L	.5-2
	6-22	25-35	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	22-60	25-35	0.2-0.6	0.14-0.18	7.4-9.0	<2	Moderate	0.32			
Yawdim----------	0-6	40-50	0.06-0.2	0.15-0.18	7.4-7.8	<2	High------	0.32	1	4	1-2
	6-15	35-50	0.06-0.2	0.14-0.20	7.9-8.4	<2	High------	0.32			
	15	---	---	---	---	---	----------	----			
175*:											
Zahill----------	0-6	20-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-------	0.37	5	4L	.5-2
	6-22	25-35	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	22-60	25-35	0.2-0.6	0.14-0.18	7.4-9.0	<2	Moderate	0.32			
Yawdim----------	0-6	40-50	0.06-0.2	0.15-0.18	7.4-7.8	<2	High------	0.32	1	4L	1-2
	6-15	35-50	0.06-0.2	0.14-0.20	7.9-8.4	<2	High------	0.32			
	15	---	---	---	---	---	----------	----			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," and "apparent," are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
1----------------- Absher	D	None---------	---	---	>6.0	---	---	>60	---	Low-------	High-----	Moderate.
2----------------- Adger	D	None---------	---	---	>6.0	---	---	>60	---	Low-------	High-----	High.
3*:												
Adger------------	D	None---------	---	---	>6.0	---	---	>60	---	Low-------	High-----	High.
Absher-----------	D	None---------	---	---	>6.0	---	---	>60	---	Low-------	High-----	Moderate.
4. Aeric Fluvaquents												
5----------------- Alona	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	High.
6----------------- Alona	B	Rare---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	High.
7. Badland												
8----------------- Banks	A	Rare---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Low.
9----------------- Barkof	D	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Moderate.
10---------------- Bascovy	D	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	High-----	High.
11*:												
Bascovy----------	D	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	High-----	High.
Sunburst---------	C	None---------	---	---	>6.0	---	---	>60	---	Low-------	High-----	Moderate.
12---------------- Benz	D	None---------	---	---	>6.0	---	---	>60	---	Low-------	High-----	Low.
13---------------- Bowbells	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
14, 15------------ Bryant	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
16*:												
Bryant-----------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Cambert----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
17----------------- Bryant Variant	B	None---------	---	---	4.0-6.0	Apparent	May-Aug	>60	---	Moderate	High------	High.
18, 19------------- Busby	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
20*:												
Busby-------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
Fleak-------------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Low-------	Moderate	Moderate.
21*:												
Busby-------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
Twilight----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	Moderate	Low.
22*:												
Busby-------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
Twilight----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	Moderate	Low.
Fleak-------------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Low-------	Moderate	Moderate.
23*:												
Busby-------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
Yamac-------------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
Fleak-------------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Low-------	Moderate	Moderate.
24*:												
Busby-------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
Yetull------------	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
25----------------- Cabba	D	None---------	---	---	>6.0	---	---	10-20	Soft	Moderate	High------	Low.
26*:												
Cabba-------------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Moderate	High------	Low.
Badland.												
27*:												
Cabba-------------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Moderate	High------	Low.
Barkof------------	D	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	High------	Moderate.
28*:												
Cabba-------------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Moderate	High------	Low.
Brandenburg-------	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
29*:												
Cabba	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Dast	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
30*:												
Cabba	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Wabek	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
Dast	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
31 Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
32*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Badland.												
33*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Kirby	A	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
34*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Twilight	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Moderate	Low.
35*, 36*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
37 Cambert	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
38*:												
Cambert	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Barkof	D	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Moderate.
Cabba	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
39*:												
Cambert	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Cabba	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
40*:												
Cambert	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Dast	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
40*:												
Cabba	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
41 Cambeth	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
42*:												
Cambeth	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
43*:												
Cambeth	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Twilight	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Moderate	Low.
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
44 Cherry	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
45*:												
Cherry	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Havrelon	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
Trembles	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
46, 47, 48, 49 Chinook	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
50 Creed	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
51*:												
Creed	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Gerdrum	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
52, 53 Dast	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
54*, 55*:												
Dast	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Blanchard	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Moderate.
56 Dimmick	D	None	---	---	+1-2.0	Apparent	Apr-Sep	>60	---	Moderate	High	Low.
57 Dimmick	D	None	---	---	1.0-3.0	Apparent	Apr-Aug	>60	---	Moderate	High	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
58, 59 Ethridge	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
60, 61 Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
62*:												
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Gerdrum	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
63 Farland	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
64 Farnuf	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
65, 66 Floweree	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
67*:												
Floweree	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Cambeth	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
68, 69 Gerdrum	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
70*:												
Gerdrum	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Absher	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
71*, 72*:												
Gerdrum	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Fleak	D	None	---	---	>6.0	---	---	10-20	Soft	Low	Moderate	Moderate.
73, 74 Glendive	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
75 Glendive	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
76 Glendive	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
77 Glendive	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
78*:												
Glendive	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Hanly	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
79 Hanly	A	Occasional	Brief	Mar-Jun	>6.0	---	---	>60	---	Low	Moderate	Low.
80 Harlem	C	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
81 Harlem	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
82 Havre	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
83 Havre	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
84 Havre	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
85 Havre	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
86 Havrelon	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
87 Havrelon	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
88 Havrelon	B	Occasional	Brief	Apr-Jul	>6.0	---	---	>60	---	Moderate	High	High.
89 Havrelon	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
90 Havrelon	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
91, 92, 93 Hillon	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
94*:												
Hillon	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Badland.												
95*:												
Hillon	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
95*:												
Yamac	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Fleak	D	None	---	---	>6.0	---	---	10-20	Soft	Low	Moderate	Moderate.
96 Hoffmanville	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
97, 98 Kremlin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
99 Lehr	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
100, 101 Lisk	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
102 Lohler	C	None	---	---	4.0-6.0	Apparent	May-Aug	>60	---	Moderate	High	Low.
103 Lohler	C	Rare	---	---	4.0-6.0	Apparent	May-Aug	>60	---	Moderate	High	Low.
104 Lohler	C	None	---	---	4.0-6.0	Apparent	May-Aug	>60	---	Moderate	High	Low.
105 Lonna	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
106*:												
Lonna	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Havre	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
Glendive	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Low	High	Low.
107, 108, 109 Macar	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
110 Macar	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
111*:												
Macar	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Cabba	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
112*:												
Macar	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Cambert	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
113 Marias	D	None	---	---	>6.0	---	---	>60	---	Low	High	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
114---------------- Marvan	D	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Moderate.
115*: Neldore-----------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Low-------	High------	Low.
Badland.												
115*: Bascovy-----------	D	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	High------	High.
116*: Neldore-----------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Low-------	High------	Low.
Bascovy-----------	D	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	High------	High.
117*: Neldore-----------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Low-------	High------	Low.
Yamac-------------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
Badland.												
118---------------- Pendroy	D	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Moderate.
119---------------- Ridgelawn	B	Rare---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
120, 121----------- Rominell	C	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
122*: Rominell----------	C	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
Yamac-------------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
123---------------- Savage	C	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
124, 125----------- Shambo	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
126*: Shambo------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Cabba-------------	D	None---------	---	---	>6.0	---	---	10-20	Soft	Moderate	High------	Low.
127*: Shambo------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Cambert-----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	High------	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
128, 129, 130 Sunburst	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
131, 132 Tally	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
133 Telstad	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
134*, 135*:												
Telstad	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Hillon	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
136*:												
Telstad	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Thoeny	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
137 Thoeny	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
138*:												
Thoeny	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Absher	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
139 Trembles	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
140 Trembles	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
141 Turner	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
142*:												
Twilight	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Moderate	Low.
Yetull	A	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
143. Typic Fluvaquents												
144. Typic Fluvaquents												
145. Typic Ustifluvents												
146*: Typic Ustorthents.												

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
146*: Typic Ustifluvents.												
147*: Ustic Torriorthents.												
Ustic Torrifluvents.												
148 Vanda	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
149, 150 Vida	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
151*, 152*: Vida	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Zahill	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
153, 154 Wabek	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
155 Weingart	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
156, 157 Williams	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
158*: Williams	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Vida	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
159, 160, 161 Yamac	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
162*: Yamac	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Twilight	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Moderate	Low.
163*: Yamac	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Twilight	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Moderate	Low.
Fleak	D	None	---	---	>6.0	---	---	10-20	Soft	Low	Moderate	Moderate.
164 Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
165*:												
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Badland.												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
166*:												
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Badland.												
Gerdrum	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
167*:												
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Kirby	A	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
168, 169, 170 Zahill	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
171*:												
Zahill	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Badland.												
172*, 173*:												
Zahill	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Cabba	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
174*, 175*:												
Zahill	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Absher	Fine, montmorillonitic Borollic Natrargids
*Adger	Fine, montmorillonitic Leptic Natriborolls
Alona	Fine-silty, mixed Borollic Camborthids
Banks	Sandy, mixed, frigid Typic Ustifluvents
Barkof	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Bascovy	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Benz	Fine-loamy, mixed (calcareous), frigid Ustic Torriorthents
Blanchard	Mixed, frigid Typic Ustipsamments
Bowbells	Fine-loamy, mixed Pachic Argiborolls
Brandenburg	Fragmental, mixed, frigid Typic Ustorthents
Bryant	Fine-silty, mixed Typic Haploborolls
Bryant Variant	Fine-silty, mixed Typic Haploborolls
Busby	Coarse-loamy, mixed Borollic Camborthids
Cabba	Loamy, mixed (calcareous), frigid, shallow Typic Ustorthents
Cabbart	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Cambert	Fine-silty, mixed, frigid Typic Ustochrepts
Cambeth	Fine-silty, mixed Borollic Camborthids
Cherry	Fine-silty, mixed, frigid Typic Ustochrepts
Chinook	Coarse-loamy, mixed Aridic Haploborolls
Creed	Fine, montmorillonitic Borollic Natrargids
Dast	Coarse-loamy, mixed (calcareous), frigid Typic Ustorthents
Dimmick	Fine, montmorillonitic, frigid Typic Haplaquolls
Ethridge	Fine, montmorillonitic Aridic Argiborolls
Evanston	Fine-loamy, mixed Aridic Argiborolls
Farland	Fine-silty, mixed Typic Argiborolls
Farnuf	Fine-loamy, mixed Typic Argiborolls
Fleak	Mixed, frigid, shallow Typic Torripsamments
Floweree	Fine-silty, mixed Aridic Haploborolls
Gerdrum	Fine, montmorillonitic Borollic Natrargids
Glendive	Coarse-loamy, mixed (calcareous), frigid Ustic Torrifluvents
Hanly	Sandy, mixed, frigid Ustic Torrifluvents
Harlem	Fine, montmorillonitic (calcareous), frigid Ustic Torrifluvents
Havre	Fine-loamy, mixed (calcareous), frigid Ustic Torrifluvents
Havrelon	Fine-loamy, mixed (calcareous), frigid Typic Ustifluvents
Hillon	Fine-loamy, mixed (calcareous), frigid Ustic Torriorthents
Hoffmanville	Clayey over sandy or sandy-skeletal, montmorillonitic (calcareous), frigid Typic Ustifluvents
Kirby	Fragmental, mixed (calcareous), frigid Ustic Torriorthents
Kremlin	Fine-loamy, mixed Aridic Haploborolls
Lehr	Fine-loamy over sandy or sandy-skeletal, mixed Typic Haploborolls
Lisk	Coarse-loamy, mixed, frigid Typic Ustochrepts
Lohler	Fine, montmorillonitic (calcareous), frigid Typic Ustifluvents
Lonna	Fine-silty, mixed Borollic Camborthids
Macar	Fine-loamy, mixed, frigid Typic Ustochrepts
Marias	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Marvan	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Neldore	Clayey, montmorillonitic, nonacid, frigid, shallow Ustic Torriorthents
Pendroy	Very-fine, montmorillonitic, frigid Udorthentic Chromusterts
Ridgelawn	Fine-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Typic Ustifluvents
Rominell	Fine-loamy, mixed Borollic Natrargids
Savage	Fine, montmorillonitic Typic Argiborolls
Shambo	Fine-loamy, mixed Typic Haploborolls
Sunburst	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Tally	Coarse-loamy, mixed Typic Haploborolls
Telstad	Fine-loamy, mixed Aridic Argiborolls
*Thoeny	Fine, montmorillonitic Borollic Natrargids
Trembles	Coarse-loamy, mixed (calcareous), frigid Typic Ustifluvents
Turner	Fine-loamy over sandy or sandy-skeletal, mixed Typic Argiborolls
Twilight	Coarse-loamy, mixed Borollic Camborthids
Vanda	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Vida	Fine-loamy, mixed Typic Argiborolls
Wabek	Sandy-skeletal, mixed Entic Haploborolls
Weingart	Fine, montmorillonitic Borollic Natrargids
Williams	Fine-loamy, mixed Typic Argiborolls
Yamac	Fine-loamy, mixed Borollic Camborthids
Yawdim	Clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents
Yetull	Mixed, frigid Ustic Torripsamments
Zahill	Fine-loamy, mixed (calcareous), frigid Typic Ustorthents

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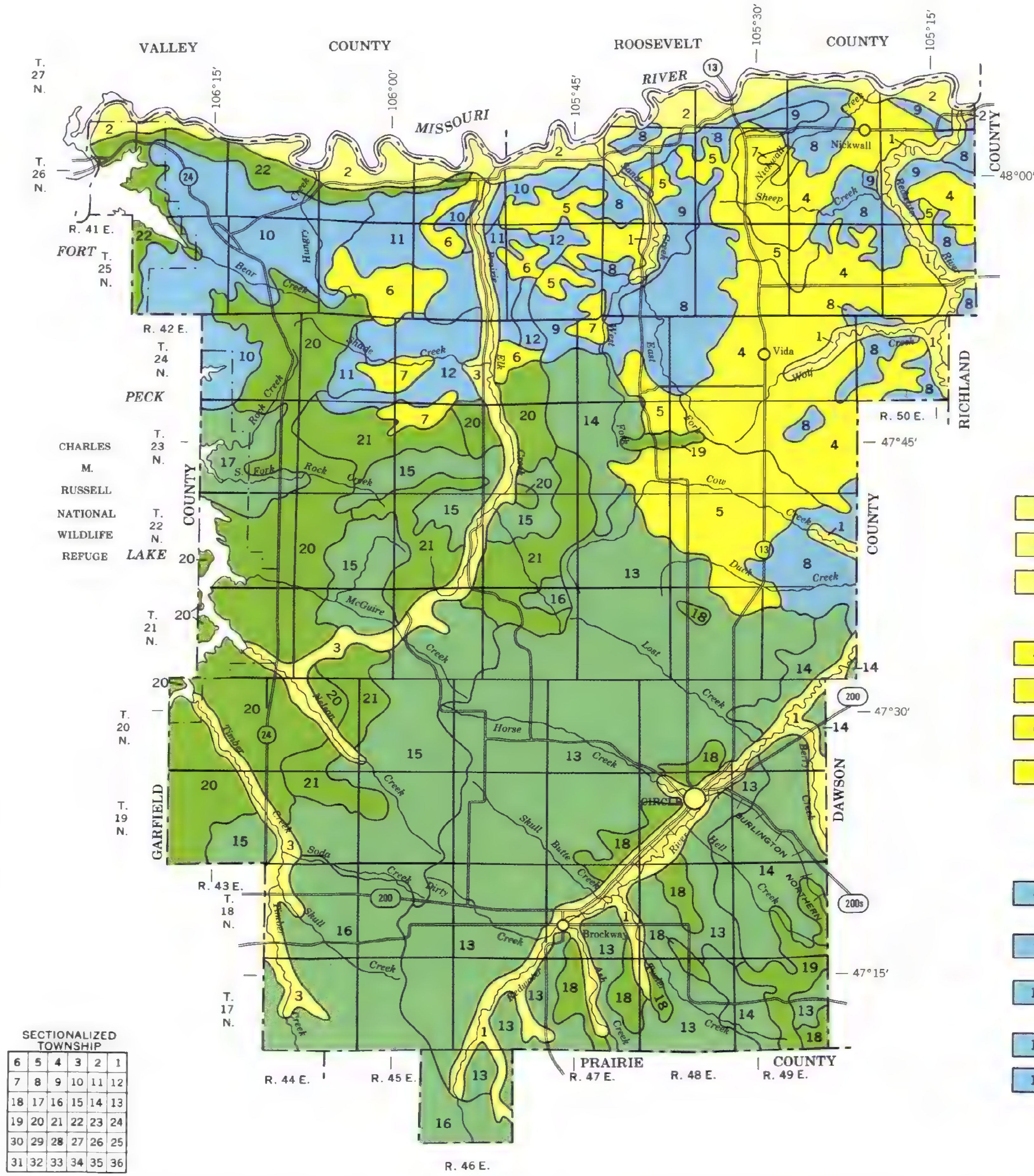
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MONTANA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

McCONE COUNTY MONTANA



N

Scale 1:506,880

2 0 2 4 6 8 Miles

2 0 8 16 Km

Compiled 1983

SOIL ASSOCIATIONS

DOMINANTLY NEARLY LEVEL ALLUVIAL SOILS THAT ARE DEEP AND WELL DRAINED; ON TERRACES AND FLOOD PLAINS

1 Cherry-Havrelon-Trembles: Loamy, moist soils that are nearly level and gently sloping and are subject to flooding

2 Harlem-Havre-Glendive: Clayey and loamy, dry soils that are nearly level and are protected from flooding

3 Lonna-Havre-Glendive: Loamy, dry soils that are nearly level and are subject to flooding

DOMINANTLY UNDULATING TO HILLY SOILS THAT ARE DEEP AND WELL DRAINED; ON GLACIATED PLAINS

4 Williams-Zahill: Loamy, moist soils that are nearly level to strongly rolling and formed in glacial till

5 Zahill-Vida: Loamy, moist soils that are undulating to hilly and formed in glacial till

6 Telstad-Hillon: Loamy, dry soils that are undulating to strongly rolling and formed in glacial till

7 Gerdrum-Hillon: Loamy, dry soils that are nearly level to hilly and formed in salt- and sodium-affected alluvium and in glacial till

DOMINANTLY STRONGLY ROLLING TO STEEP SOILS THAT ARE SHALLOW TO DEEP AND WELL DRAINED AND SOMEWHAT EXCESSIVELY DRAINED; ON GLACIATED PLAINS

8 Zahill-Cabba: Loamy, moist soils that are deep and shallow, are strongly rolling to steep, and formed in glacial till and material derived from weakly consolidated, sandy and silty sedimentary beds

9 Zahill-Badland: Loamy, moist soils that are deep, are hilly to very steep, and formed in glacial till, and Badland

10 Sunburst-Fleak-Busby: Loamy and sandy, dry soils that are deep and shallow, are hilly and steep, and formed in glacial till, in material derived from weakly consolidated sandy sedimentary beds, and in alluvium

11 Hillon: Loamy, dry soils that are deep, are strongly rolling to steep, and formed in glacill till

12 Hillon-Badland: Loamy, dry soils that are deep, are hilly and steep, and formed in glacial till, and Badland

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

DOMINANTLY GENTLY SLOPING TO MODERATELY STEEP SOILS THAT ARE SHALLOW TO DEEP AND ARE WELL DRAINED; ON SEDIMENTARY UPLANDS

13 Cambert-Bryant: Loamy, moist soils that are moderately deep and deep, are nearly level to strongly sloping, and formed in alluvium and in material derived from weakly consolidated, silty sedimentary beds

14 Cabba-Cambert: Loamy, moist soils that are shallow and moderately deep, are gently sloping to moderately steep, and formed in material derived from weakly consolidated, sandy and silty sedimentary beds

15 Cabbart-Busby: Loamy, dry soils that are shallow and deep, are moderately sloping to moderately steep, and formed in material derived from weakly consolidated, sandy and silty sedimentary beds and in alluvium

16 Cambeth-Floweree: Loamy, dry soils that are moderately deep and deep, are gently sloping to strongly sloping, formed in local alluvium and in material derived from weakly consolidated, silty sedimentary beds

17 Gerdrum-Busby-Yamac: Loamy, dry soils that are deep, are moderately sloping to moderately steep, and formed in alluvium

DOMINANTLY STRONGLY SLOPING TO STEEP SOILS THAT ARE SHALLOW TO DEEP AND WELL DRAINED TO EXCESSIVELY DRAINED; ON SEDIMENTARY UPLANDS

18 Cabba-Dast-Wabek: Loamy, moist soils that are shallow to deep, are strongly sloping to steep, and formed in material derived from weakly consolidated, silty and sandy sedimentary beds and in gravelly alluvium

19 Cabba-Badland: Loamy, moist soils that are shallow, are moderately steep to steep, and formed in material derived from weakly consolidated, sandy and silty sedimentary beds, and Badland

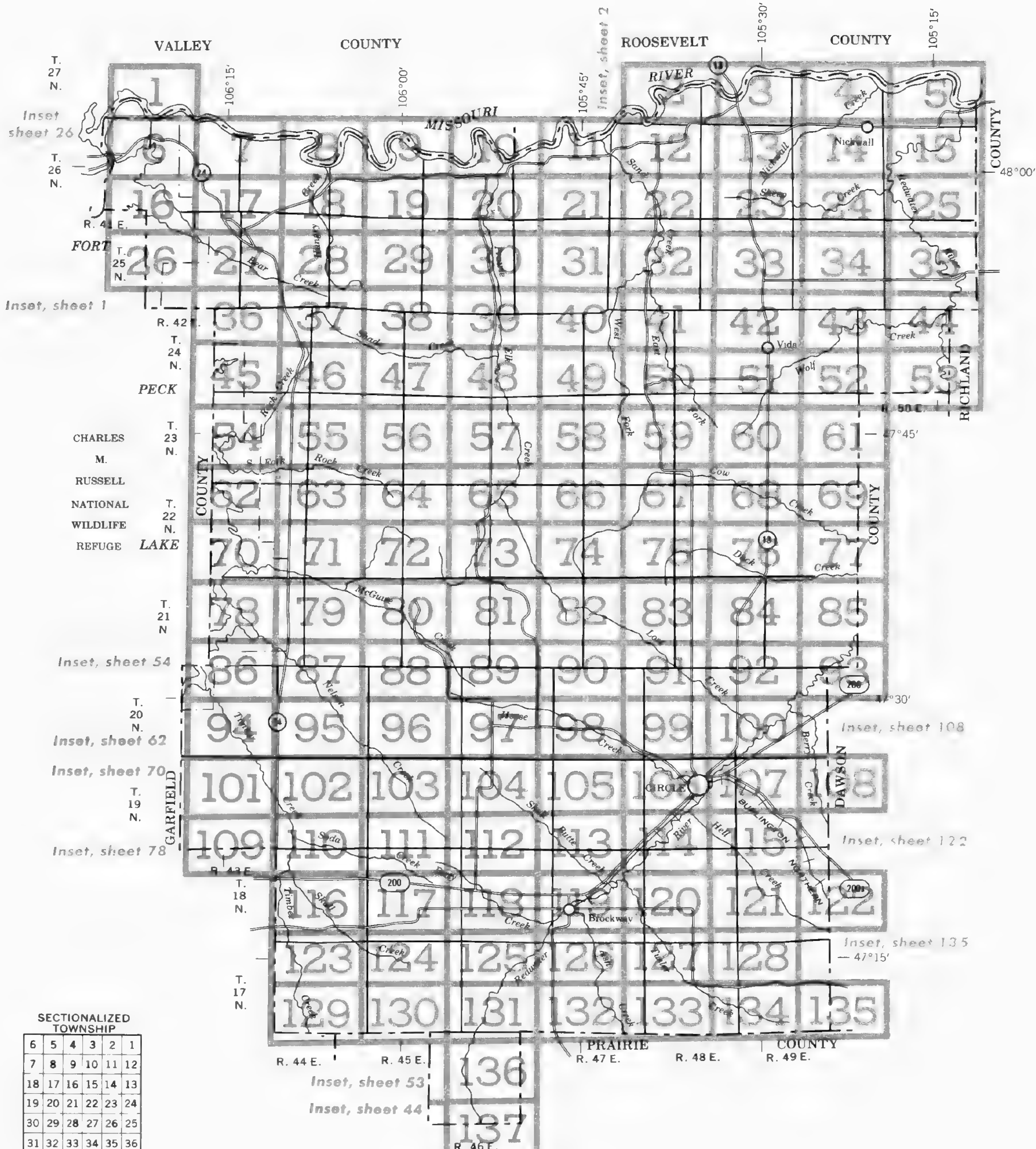
20 Badland-Gerdrum-Cabbart: Badland, and loamy, dry soils that are deep and shallow, are strongly sloping to steep, and formed in salt- and sodium-affected alluvium and in material derived from weakly consolidated, sandy and silty sedimentary beds

21 Cabbart-Busby-Badland: Loamy, dry soils that are shallow and deep, are moderately steep and steep, and formed in material derived from weakly consolidated, sandy and silty sedimentary beds and in alluvium, and Badland

22 Neldore-Bascovy-Badland: Clayey, dry soils that are shallow and moderately deep, are moderately steep and steep, and formed in material derived from consolidated shale, and Badland

INDEX TO MAP SHEETS

McCONE COUNTY MONTANA



N

Scale 1:506,880

2 0 2 4 6 8 Miles

2 0 8 16 Km

SOIL LEGEND

SYMBOL	NAME
1	Absher clay loam, 8 to 15 percent slopes
2	Adger silty clay loam 0 to 8 percent slopes
3	Adger Absher complex, 0 to 8 percent slopes
4	Aeric Fluvaquents, loamy
5	Alona silt loam, 0 to 8 percent slopes
6	Alona silt loam saline, 0 to 2 percent slopes
7	Badland
8	Banks fine sandy loam
9	Barkof silty clay 2 to 8 percent slopes
10	Bascovy silty clay 2 to 8 percent slopes
11	Bascovy-Sunburst complex, 15 to 45 percent slopes
12	Benz clay loam 0 to 8 percent slopes
13	Bowbells loam
14	Bryant silt loam 0 to 4 percent slopes
15	Bryant silt loam, 4 to 8 percent slopes
16	Bryant-Cambert complex 2 to 8 percent slopes
17	Bryant Variant silt loam 0 to 2 percent slopes
18	Busby fine sandy loam 2 to 8 percent slopes
19	Busby fine sandy loam 8 to 15 percent slopes
20	Busby Fleak complex, 15 to 45 percent slopes
21	Busby-Twilight fine sandy loams 2 to 8 percent slopes
22	Busby-Twilight Fleak complex, 8 to 15 percent slopes
23	Busby-Yamac-Fleak complex, 15 to 45 percent slopes
24	Busby-Yetull fine sandy loams, 2 to 8 percent slopes
25	Cabba loam, 15 to 25 percent slopes
26	Cabba-Badland complex, 15 to 45 percent slopes
27	Cabba Barkof complex, 15 to 45 percent slopes
28	Cabba-Brandenburg complex, 8 to 45 percent slopes
29	Cabba Dast complex, 15 to 45 percent slopes
30	Cabba-Wabek-Dast Complex, 15 to 45 percent slopes
31	Cabbart silt loam, 15 to 25 percent slopes
32	Cabbart Badland complex, 15 to 45 percent slopes
33	Cabbart-Kirby complex, 8 to 45 percent slopes
34	Cabbart Twilight complex 15 to 45 percent slopes
35	Cabbart Yawdim complex, 4 to 15 percent slopes
36	Cabbart Yawdim complex, 15 to 45 percent slopes
37	Cambert loam, 2 to 8 percent slopes
38	Cambert Barkof Cabba complex 4 to 15 percent slopes
39	Cambert Cabba loams 8 to 15 percent slopes
40	Cambert Dast Cabba complex, 4 to 15 percent slopes
41	Cambeth silt loam, 2 to 8 percent slopes
42	Cambeth Cabbart silt loams, 8 to 15 percent slopes
43	Cambeth-Twilight-Cabbart complex 4 to 15 percent slopes
44	Cherry silt loam, 0 to 4 percent slopes
45	Cherry-Havrelon-Trembles complex, 0 to 2 percent slopes
46	Chinook fine sandy loam, 0 to 4 percent slopes
47	Chinook fine sandy loam, 4 to 8 percent slopes
48	Chinook fine sandy loam, 8 to 15 percent slopes
49	Chinook fine sandy loam, guillied, 2 to 8 percent slopes
50	Creed loam, 0 to 8 percent slopes
51	Creed Gerdrum complex, 0 to 8 percent slopes
52	Dast fine sandy loam, 2 to 8 percent slopes
53	Dast fine sandy loam 8 to 15 percent slopes
54	Dast Blanchard complex, 2 to 8 percent slopes
55	Dast Blanchard complex, 8 to 25 percent slopes
56	Dimmick silty clay
57	Dimmick clay, drained
58	Ethridge silty clay loam, 0 to 4 percent slopes
59	Ethridge silty clay loam, 4 to 8 percent slopes
60	Evanston loam, 0 to 2 percent slopes
61	Evanston loam, 2 to 8 percent slopes
62	Evanston-Gerdrum complex, 2 to 8 percent slopes
63	Farland silt loam, 0 to 4 percent slopes
64	Farnuf loam, 0 to 4 percent slopes
65	Floweree silt loam, 0 to 4 percent slopes
66	Floweree silt loam, 4 to 8 percent slopes
67	Floweree Cambeth silt loams, 2 to 8 percent slopes
68	Gerdrum clay loam, 0 to 8 percent slopes
69	Gerdrum clay loam guillied 8 to 15 percent slopes
70	Gerdrum-Absher clay loams 0 to 8 percent slopes
71	Gerdrum Yawdim-Fleak complex, 0 to 8 percent slopes
72	Gerdrum Yawdim-Fleak complex, 8 to 45 percent slopes
73	Glendive sandy loam
74	Glendive loam
75	Glendive loam, protected
76	Glendive silty clay loam
77	Glendive silty clay loam protected
78	Glendive-Hanley complex, protected
79	Hanly loamy fine sand
80	Harlem silty clay
81	Harlem silty clay, protected
82	Havre silt loam
83	Havre silt loam, protected
84	Havre silty clay loam
85	Havre silty clay loam, protected
86	Havrelon loam
87	Havrelon loam protected
88	Havrelon loam saline
89	Havrelon silty clay loam
90	Havrelon silty clay loam, protected
91	Hillon loam, 2 to 8 percent slopes
92	Hillon loam, 8 to 15 percent slopes
93	Hillon loam, 15 to 45 percent slopes
94	Hillon-Badland complex, 15 to 45 percent slopes
95	Hillon-Yamac Fleak complex, 15 to 45 percent slopes
96	Hoffmanville silty clay, protected
97	Kremlin loam 0 to 4 percent slopes
98	Kremlin loam, 4 to 8 percent slopes
99	Lehr loam 2 to 8 percent slopes
100	Lisk sandy loam, 2 to 8 percent slopes
101	Lisk sandy loam, 8 to 15 percent slopes
102	Lohler silty clay loam protected
103	Lohler silty clay
104	Lohler silty clay protected
105	Lonna silty clay loam, 0 to 4 percent slopes
106	Lonna Havre-Glendive complex 0 to 2 percent slopes
107	Macar loam, 0 to 4 percent slopes
108	Macar loam, 4 to 8 percent slopes
109	Macar loam, 8 to 15 percent slopes
110	Macar loam, saline 0 to 4 percent slopes
111	Macar-Cabba loams, 8 to 15 percent slopes
112	Macar-Cambert loams 2 to 8 percent slopes
113	Marias clay
114	Marvan clay, 0 to 8 percent slopes
115	Neldore Badland Bascovy complex, 15 to 45 percent slopes
116	Neldore-Bascovy complex, 2 to 15 percent slopes
117	Neldore Yamac Badland complex 15 to 45 percent slopes
118	Pendroy clay
119	Ridgelawn silt loam
120	Rominell loam 0 to 8 percent slopes
121	Rominell loam guillied, 0 to 8 percent slopes
122	Rominell Yamac loams, 4 to 15 percent slopes
123	Savage silty clay loam, 0 to 4 percent slopes
124	Shambo loam, 0 to 4 percent slopes
125	Shambo loam, 4 to 8 percent slopes
126	Shambo-Cabba loams, 8 to 15 percent slopes
127	Shambo-Cambert loams, 2 to 8 percent slopes
128	Sunburst clay loam 2 to 8 percent slopes
129	Sunburst clay loam, 8 to 15 percent slopes
130	Sunburst clay loam, 15 to 45 percent slopes
131	Tally fine sandy loam, 0 to 4 percent slopes
132	Tally fine sandy loam, 4 to 8 percent slopes
133	Telstad loam, 2 to 8 percent slopes
134	Telstad Hillon loams, 2 to 8 percent slopes
135	Telstad Hillon loams, 8 to 15 percent slopes
136	Telstad Thoeny loams, 2 to 8 percent slopes
137	Thoeny loam, 2 to 8 percent slopes
138	Thoeny-Absher complex 2 to 8 percent slopes
139	Trembles fine sandy loam
140	Trembles fine sandy loam, protected
141	Turner loam, 0 to 4 percent slopes
142	Twilight-Yetull fine sandy loams, 8 to 15 percent slopes
143	Typic fluvaquents, frequently flooded
144	Typic fluvaquents, saline
145	Typic Ustifluvents, saline
146	Typic Ustorthents-Typic Ustifluvents association
147	Ustic Torriorthents Ustic Torrifluvents association
148	Vanda clay, 0 to 8 percent slopes
149	Vida clay loam, 0 to 2 percent slopes
150	Vida clay loam, 2 to 8 percent slopes
151	Vida-Zahill complex 2 to 8 percent slopes
152	Vida-Zahill complex, 8 to 15 percent slopes
153	Wabek sandy loam, 4 to 15 percent slopes
154	Wabek sandy loam, 15 to 45 percent slopes
155	Weingart clay 2 to 8 percent slopes
156	Williams loam, 0 to 2 percent slopes
157	Williams loam, 2 to 4 percent slopes
158	Williams Vida complex, 2 to 4 percent slopes
159	Yamac loam, 0 to 4 percent slopes
160	Yamac loam, 4 to 8 percent slopes
161	Yamac loam, 8 to 15 percent slopes
162	Yamac-Twilight complex, 2 to 8 percent slopes
163	Yamac-Twilight-Fleak complex, 8 to 15 percent slopes
164	Yawdim silty clay, 2 to 8 percent slopes
165	Yawdim Badland-Cabbart association
166	Yawdim Badland Gerdrum association
167	Yawdim-Kirby complex, 8 to 35 percent slopes
168	Zahill loam 2 to 8 percent slopes
169	Zahill loam, 8 to 15 percent slopes
170	Zahill loam 15 to 45 percent slopes
171	Zahill Badland complex, 25 to 45 percent slopes
172	Zahill-Cabba loams, 8 to 15 percent slopes
173	Zahill Cabba loams, 15 to 45 percent slopes
174	Zahill Yawdim complex, 4 to 15 percent slopes
175	Zahill Yawdim complex, 15 to 45 percent slopes

The recommended publication symbols are numeric and map units are arranged alphabetically. Soils without a slope designation in the name are level or nearly level or miscellaneous areas

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label) — Hedley Airstrip

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 21
- Federal — 173
- State — 28
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water

PITS — w

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 131 132

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

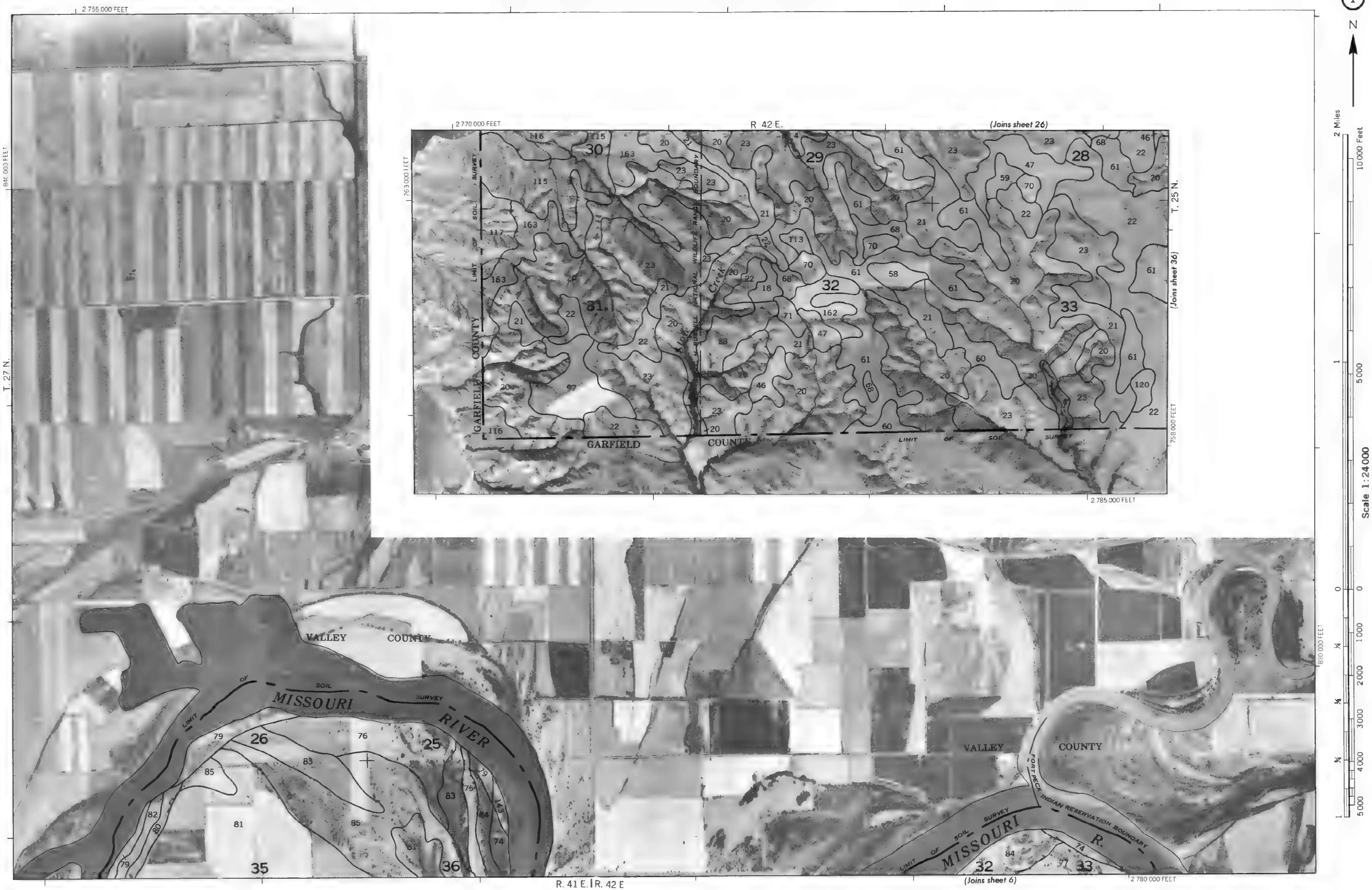
GULLY

DEPRESSION OR SINK

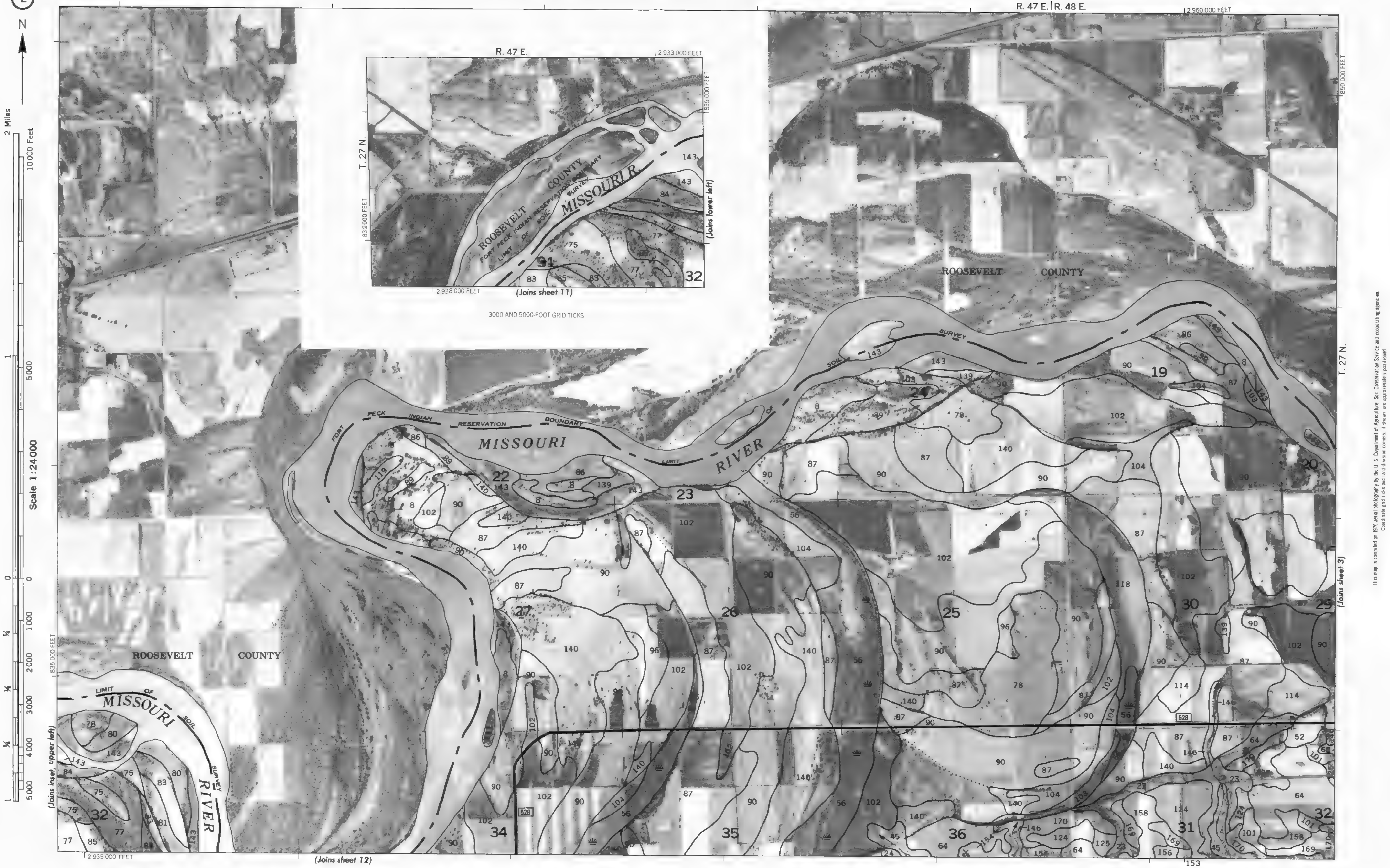
SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
Scale 1:24 000
2 Miles
10 000 Feet
R. 47 E.
R. 47 E. | R. 48 E.
2 933 000 FEET
835 000 FEET
832 000 FEET
2 928 000 FEET
2 960 000 FEET
850 000 FEET
835 000 FEET
2 935 000 FEET
T. 27 N.
ROOSEVELT COUNTY
FORT PECK INDIAN RESERVATION BOUNDARY
LIMIT OF SOIL SURVEY
MISSOURI R.
MISSOURI RIVER
(Joins lower left)
(Joins sheet 11)
3000 AND 5000-FOOT GRID TICKS
(Joins inset, upper left)
(Joins sheet 12)
(Joins sheet 3)
528
153
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

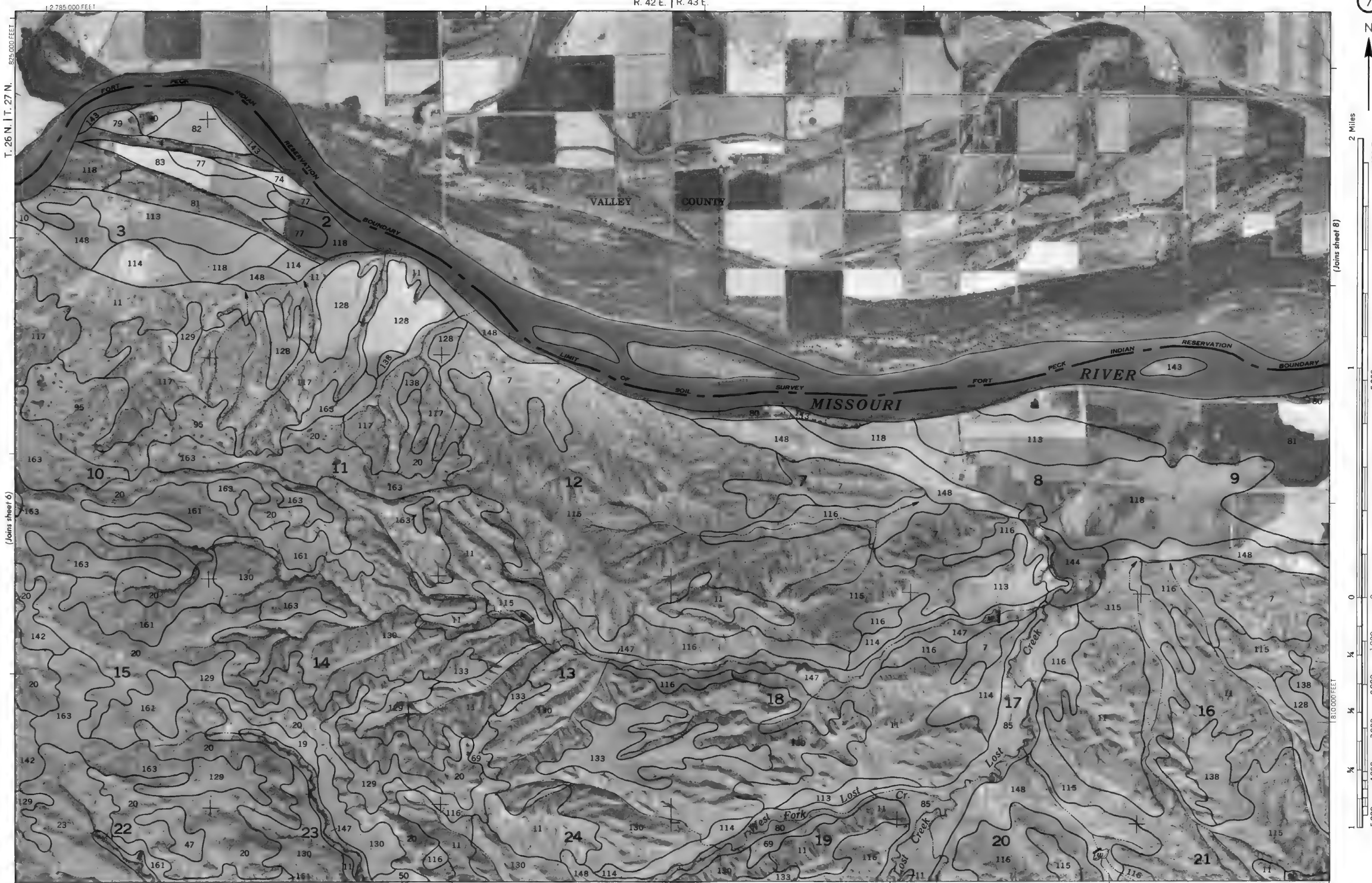

2 965 000 FEET
R. 48 E. | R. 49 E.
850 000 FEET
ROOSEVELT
COUNTY
MISSOURI
RIVER
LIMIT OF SOIL SURVEY
FORT PECK INDIAN RESERVATION BOUNDARY
T. 27 N.
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 13)
2 990 000 FEET
N
2 Miles
10 000 Feet
Scale 1:24 000


4
N
ROOSEVELT
COUNTY
MISSOURI
RIVER
FORT PECK INDIAN RESERVATION BOUNDARY
LIMIT OF SOIL SURVEY
R. 49 E. | R. 50 E.
T. 27 N.
3 020 000 FEET
850 000 FEET
835 000 FEET
2 995 000 FEET
(Joins sheet 3)
(Joins sheet 5)
(Joins sheet 14)
Creek
Scale 1:24 000
2 Miles
10000 Feet
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

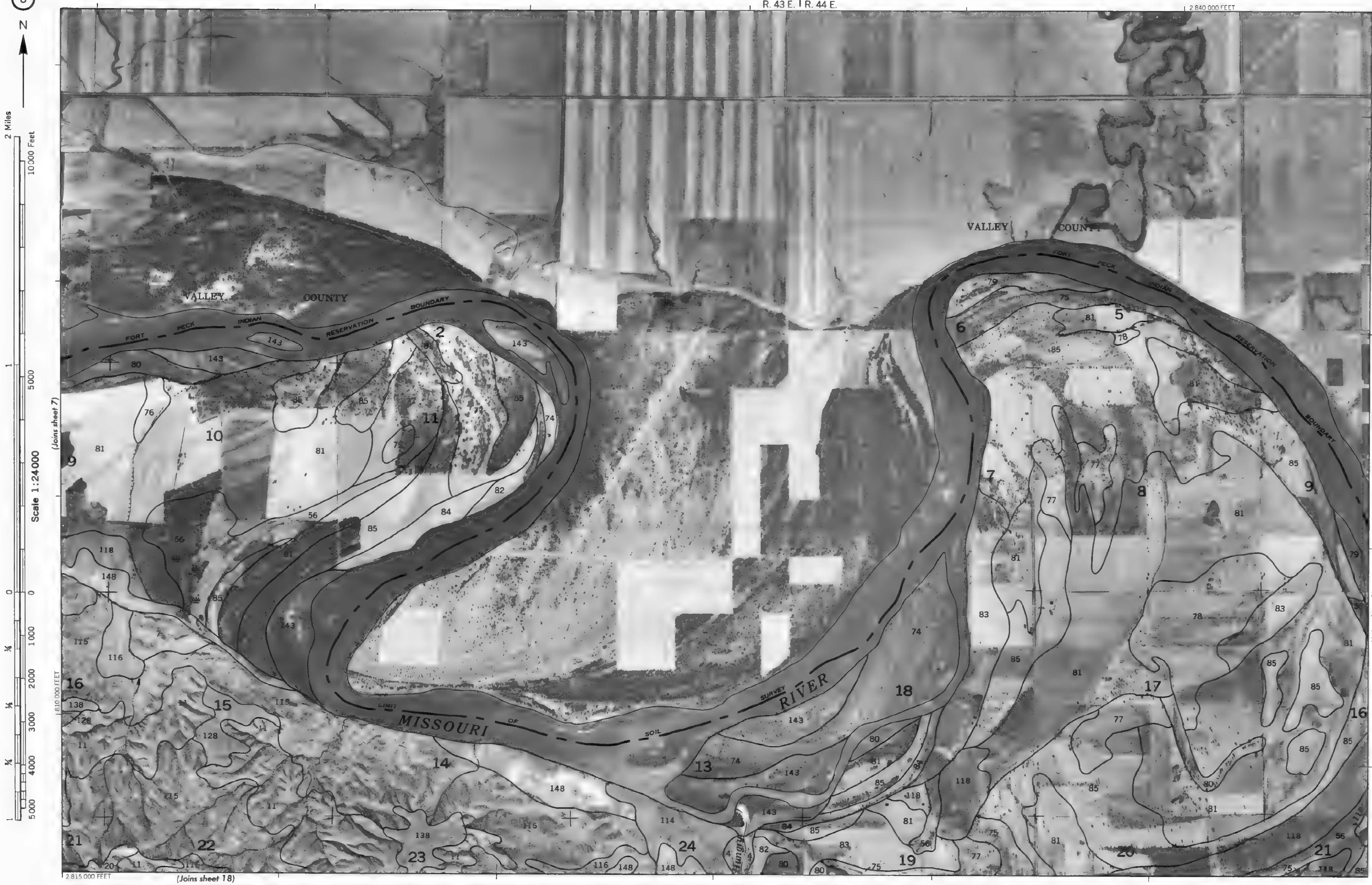
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 7

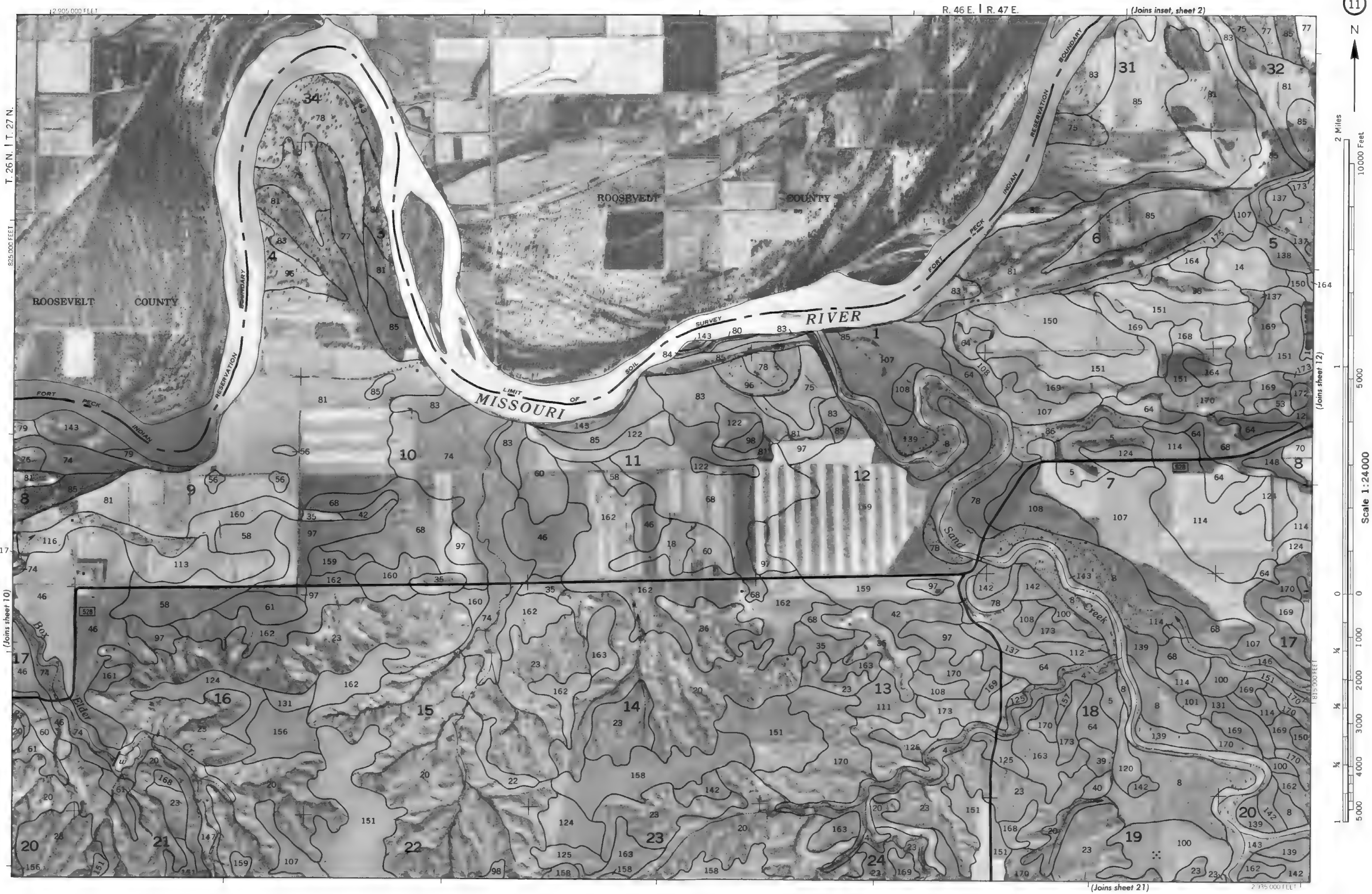


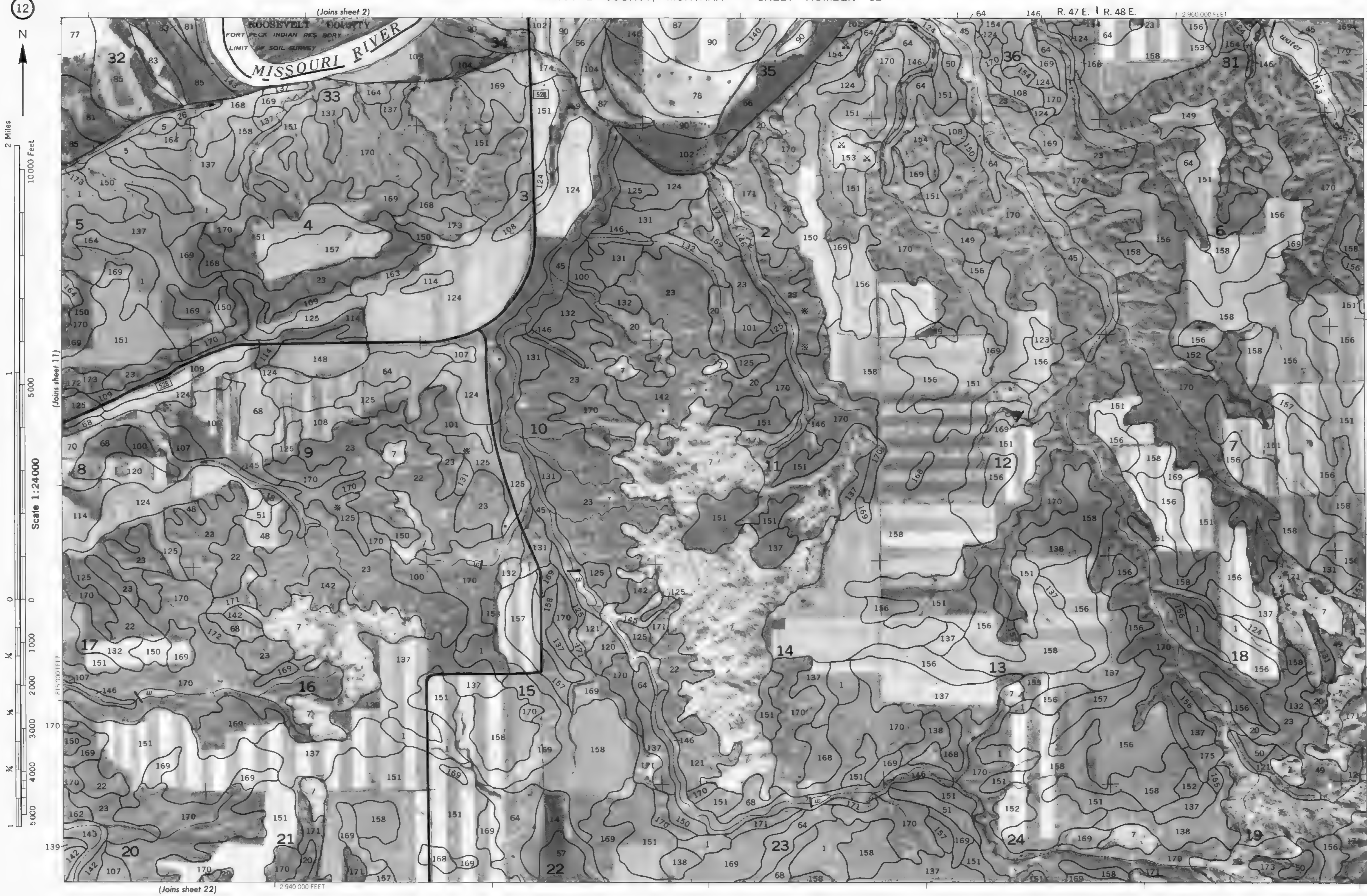
McCONE COUNTY, MONTANA — SHEET NUMBER 8




9
N
2 845 000 FEET
R. 44 E. | R. 45 E.
T. 26 N. | T. 27 N.
(Joins sheet 8)
(Joins sheet 10)
(Joins sheet 19)
2 870 000 FEET
810 000 FEET
MISSOURI
RIVER
LIMIT OF SOIL SURVEY
FORT PECK INDIAN RESERVATION BOUNDARY
VALLEY COUNTY
VALLEY COUNTY
Scale 1:24 000
2 Miles
1
0
10000 Feet
5000
0
1000
2000
3000
4000
5000
¼
½
¾
2
3
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24


10
N
2 Miles
10000 Feet
Scale 1:24 000
(Joins sheet 9)
(Joins sheet 11)
(Joins sheet 20)
R. 45 E. | R. 46 E.
T. 26 N. | T. 27 N.
VALLEY COUNTY
ROOSEVELT COUNTY
MISSOURI RIVER
FORT PECK INDIAN RESERVATION BOUNDARY
LIMIT OF SOIL SURVEY
Prairie Elk Creek
Box Elder
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


11
R. 46 E. | R. 47 E.
(Joins inset, sheet 2)
T. 26 N. | T. 27 N.
ROOSEVELT COUNTY
ROOSEVELT COUNTY
MISSOURI RIVER
FORT PECK INDIAN RESERVATION BOUNDARY
LIMIT OF SOIL SURVEY
Sand Creek
Box Elder Cr.
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 21)
528
N
Scale 1:24 000
2 Miles
10000 Feet
2 905 000 FEET
825 000 FEET
815 000 FEET
2 735 000 FEET



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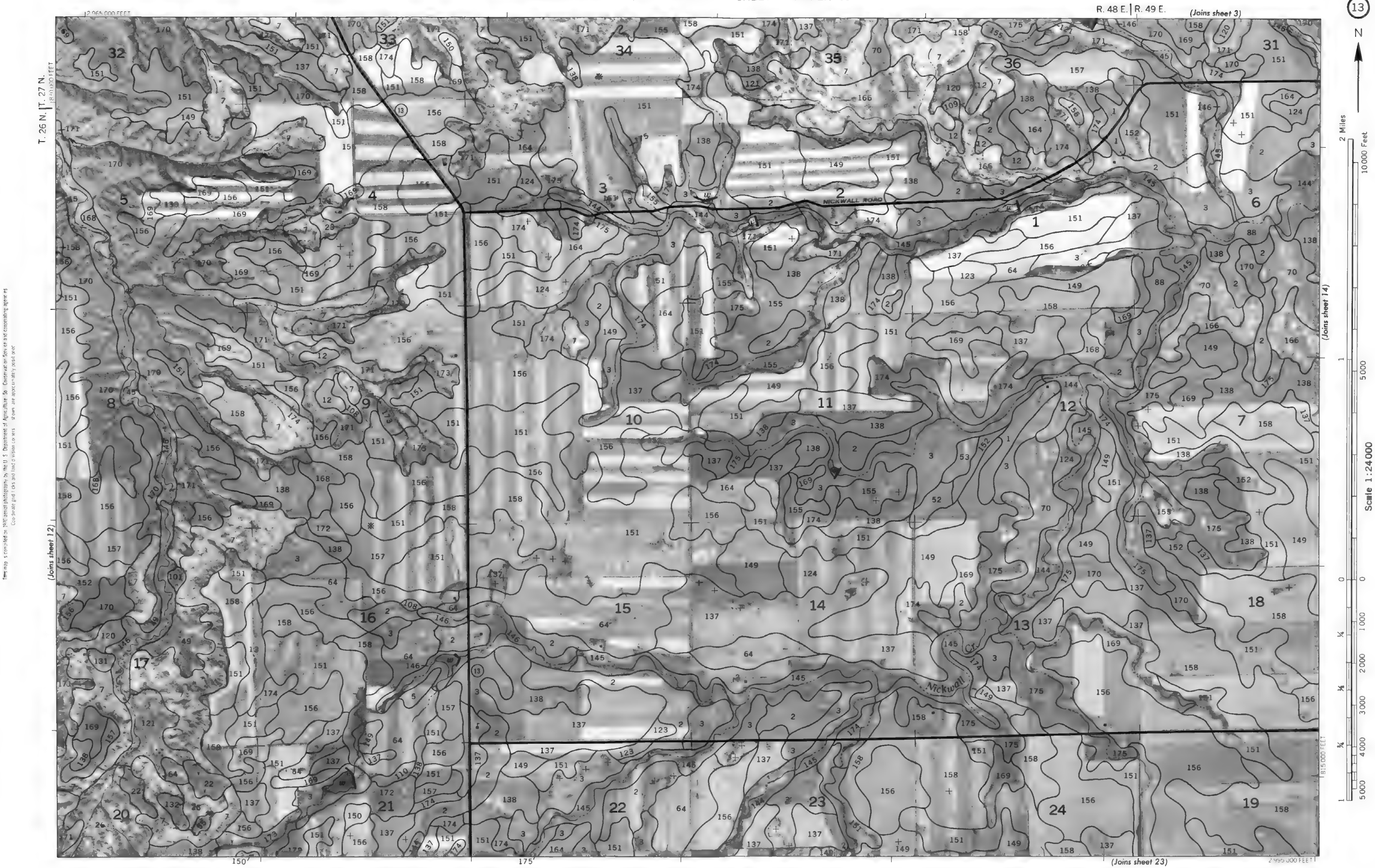
McCONE COUNTY, MONTANA — SHEET NUMBER 13



McCONE COUNTY, MONTANA — SHEET NUMBER 14

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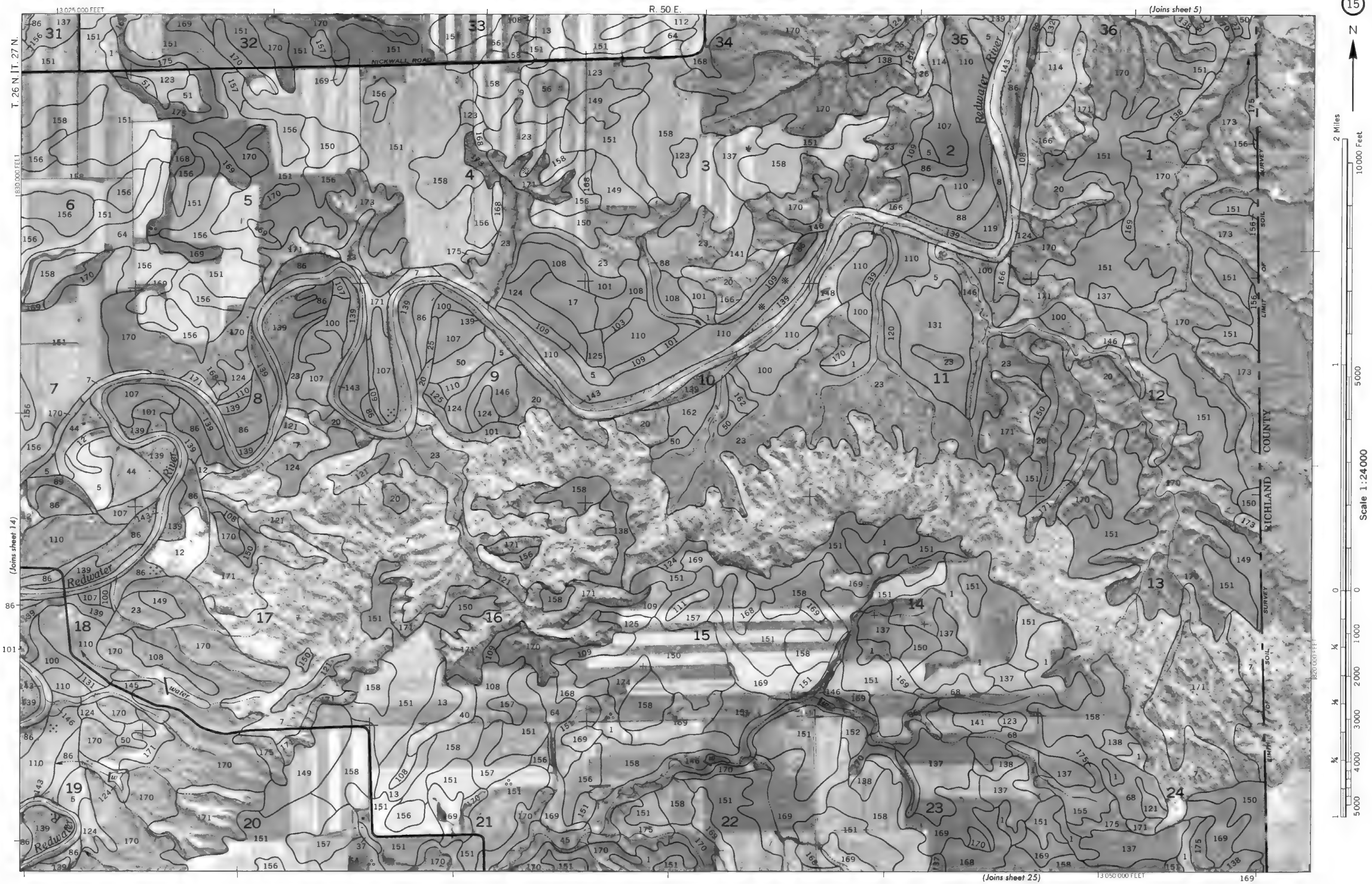
15
N
R. 50 E.
T. 26 N. | T. 27 N.
(Joins sheet 5)
(Joins sheet 14)
(Joins sheet 25)
NICKWALL ROAD
Redwater River
Redwater
RICHLAND COUNTY
SURVEY LIMIT OF SOIL
Scale 1:24000
2 Miles
10000 Feet
13 025 000 FEET
830 000 FEET
820 000 FEET
13 050 000 FEET

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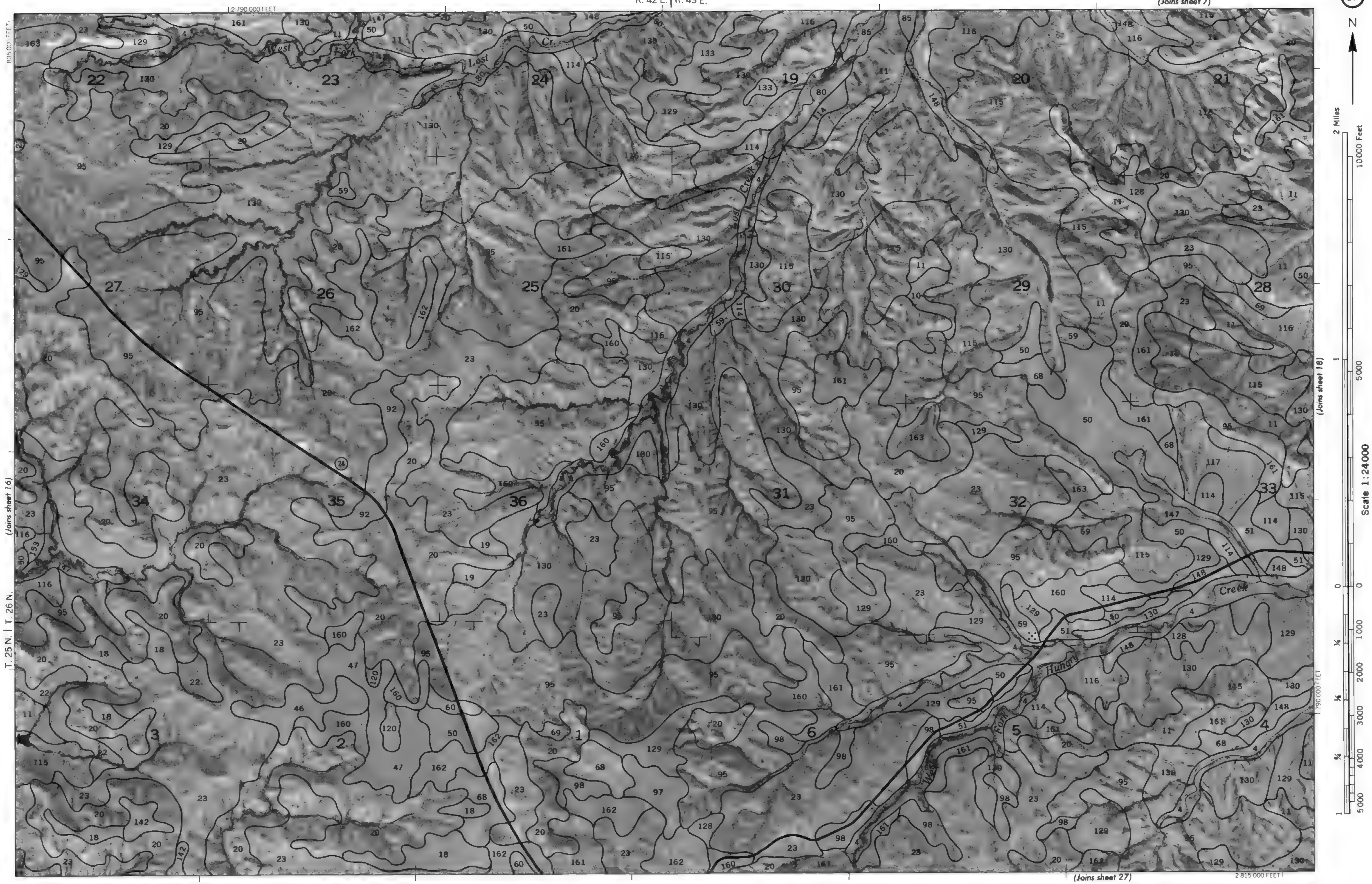
Coordinate grid ticks and land divisions corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 17



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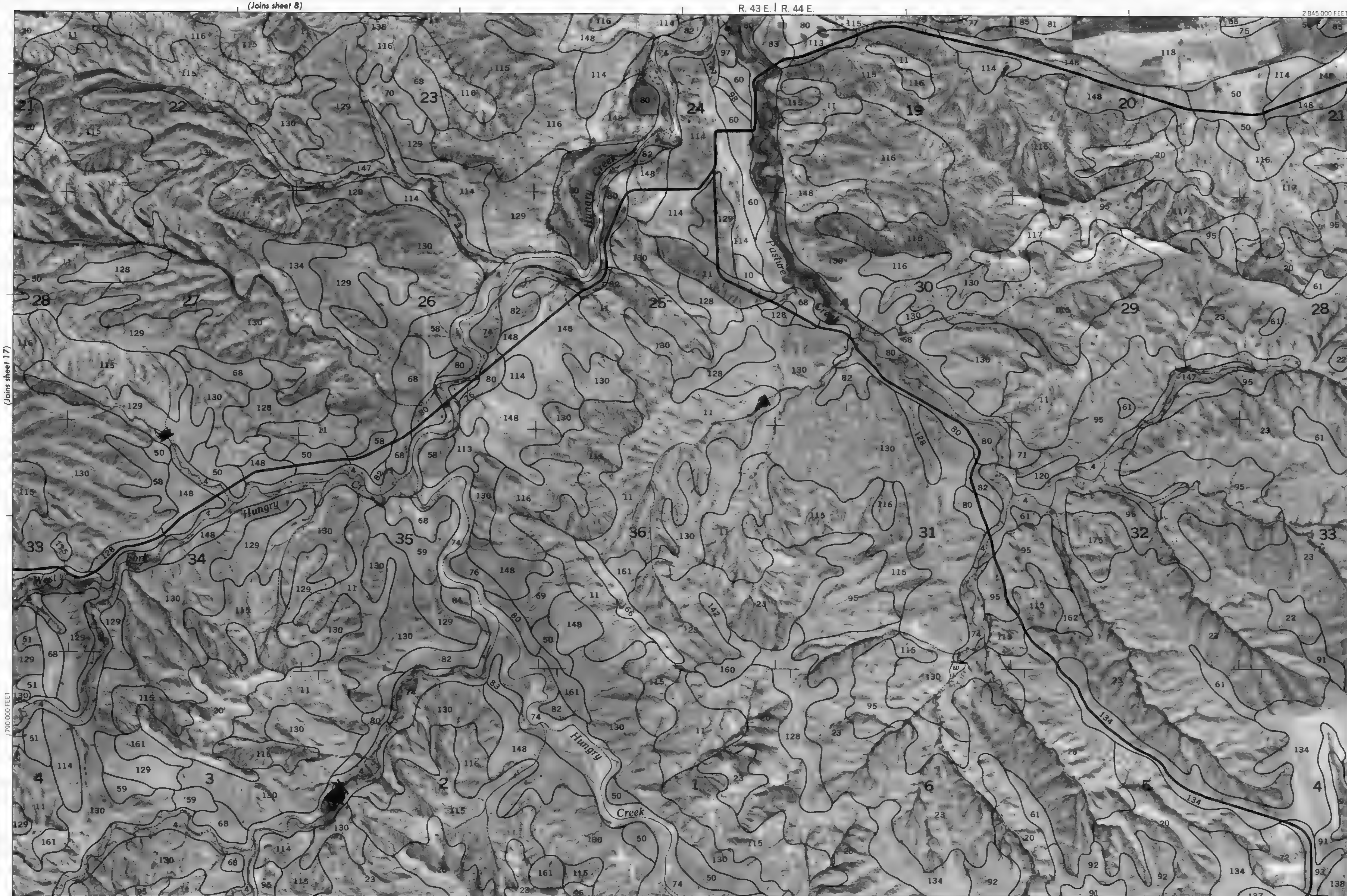
18

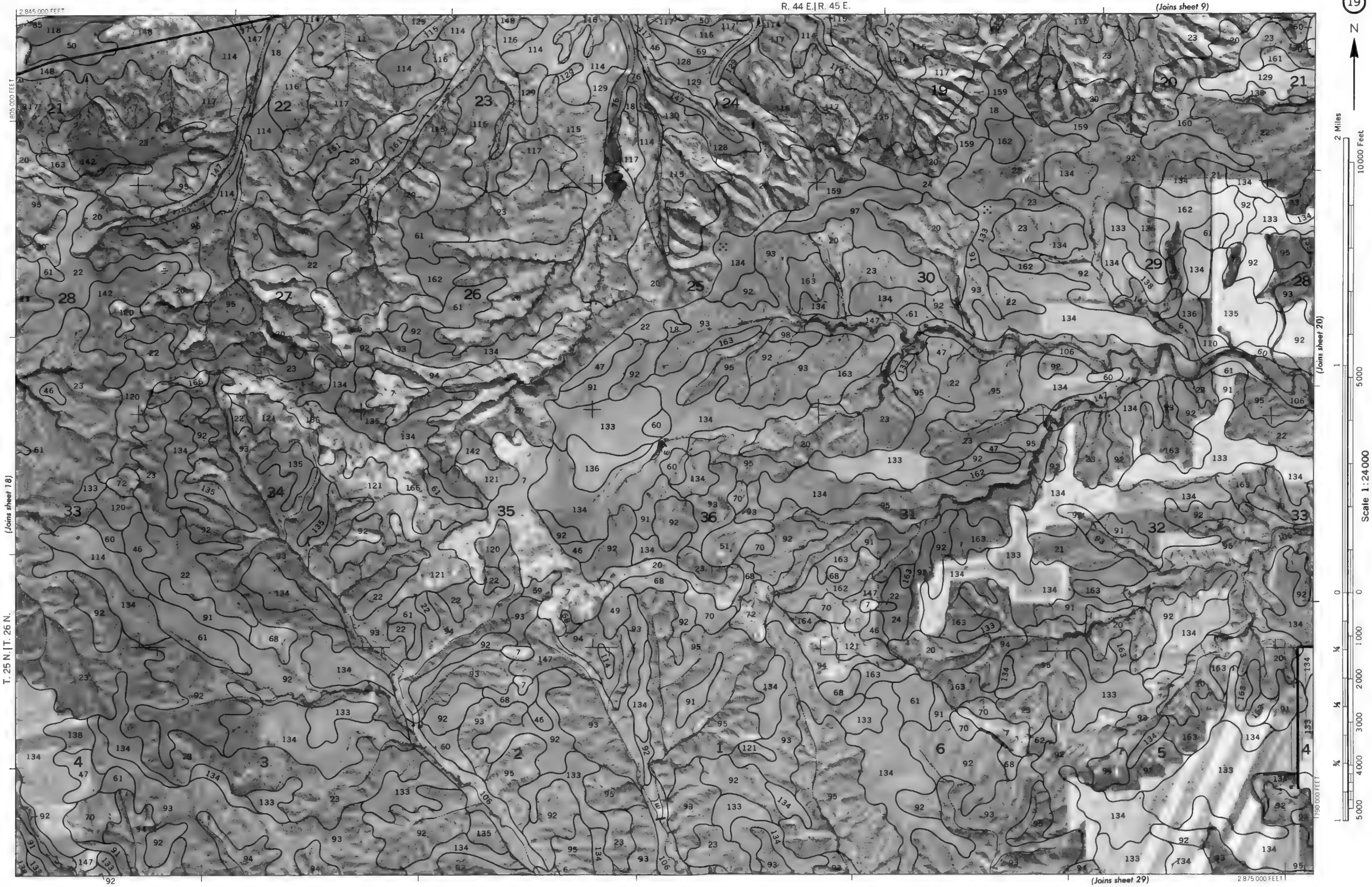
McCONE COUNTY, MONTANA — SHEET NUMBER 18



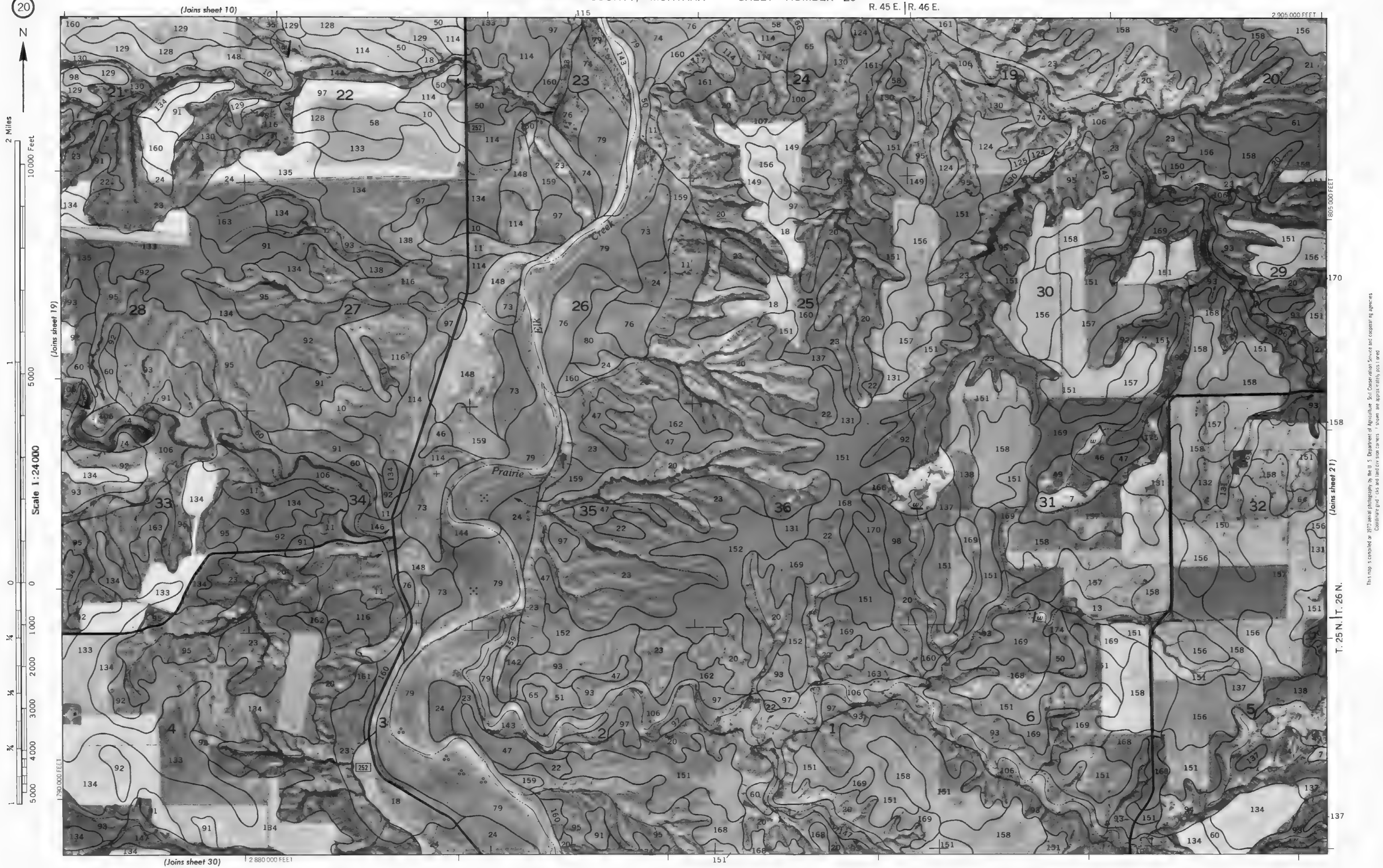
N

2 Miles
10 000 Feet
Scale 1:24 000
1
5000
0
0
¼
1000
2000
½
3000
¾
4000
1
5000

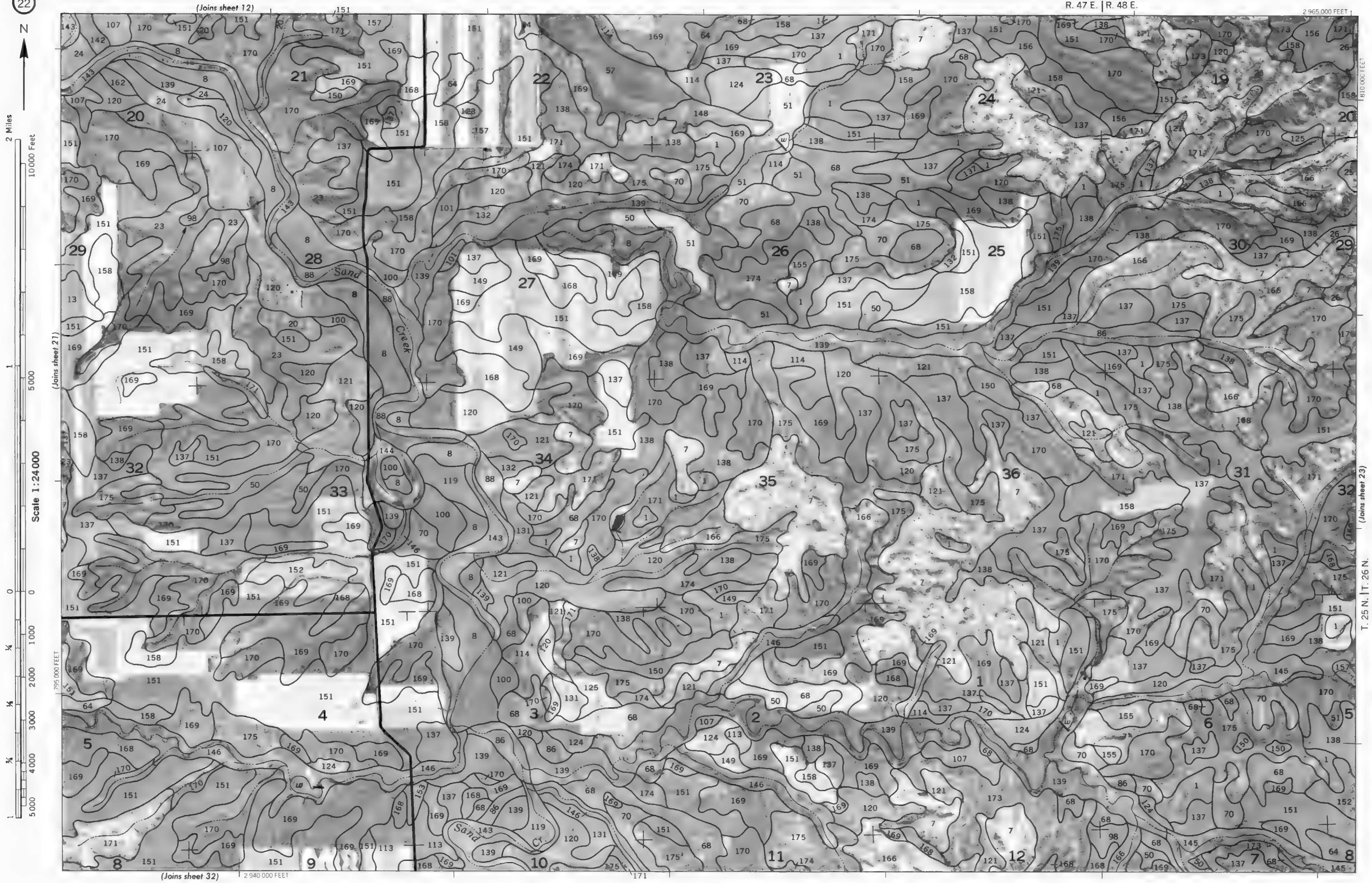
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

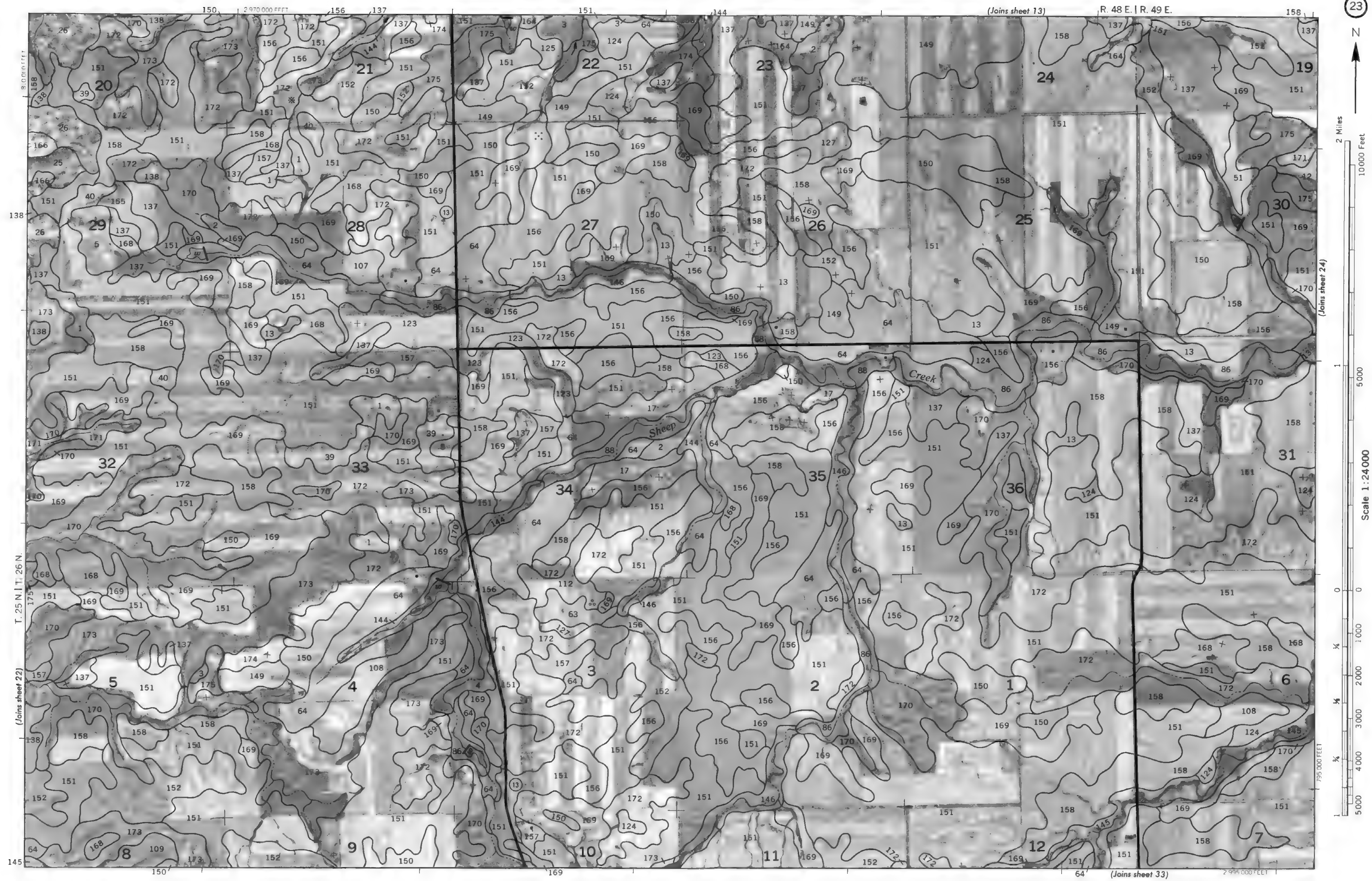

R. 44 E. | R. 45 E.
(Joins sheet 9)
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 29)
T. 25 N. | T. 26 N.
2 845 000 FEET
2 875 000 FEET
N
2 Miles
10000 Feet
Scale 1:24 000

McCONE COUNTY, MONTANA — SHEET NUMBER 20

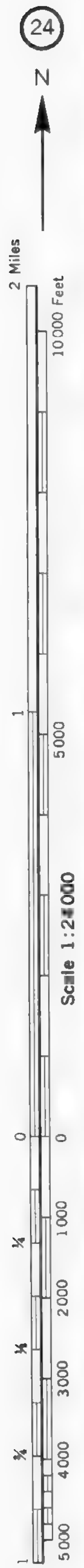


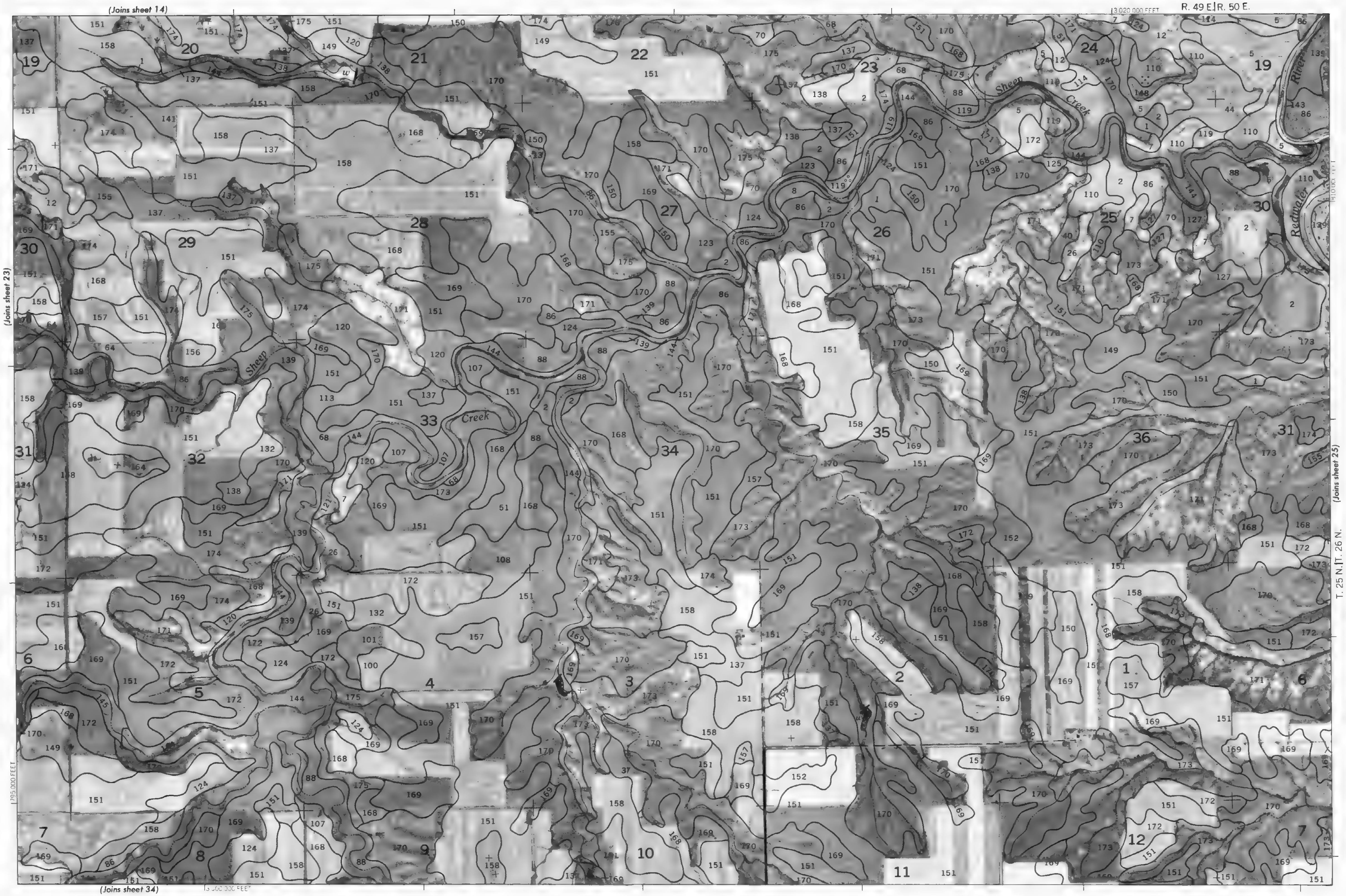
21
R. 46 E. | R. 47 E.
(Joins sheet 11)
(Joins sheet 22)
(Joins sheet 20)
(Joins sheet 31)
T. 26 N. | T. 25 N.
N
Scale 1:24000
2 Miles
10000 Feet


22
N
(Joins sheet 12)
R. 47 E. | R. 48 E.
2 965 000 FEET
810 000 FEET
(Joins sheet 21)
(Joins sheet 23)
T. 25 N. | T. 26 N.
795 000 FEET
(Joins sheet 32)
2 940 000 FEET
Sand Creek
Sand Cr.
Scale 1:24 000
2 Miles
10 000 Feet
5000
1
0
1000
2000
3000
4000
5 000
½
¼
¾


23
(Joins sheet 13)
R. 48 E. | R. 49 E.
(Joins sheet 24)
(Joins sheet 22)
(Joins sheet 33)
T. 26 N.
T. 25 N.
Sheep
Creek
N
2 Miles
10000 Feet
Scale 1:24 000

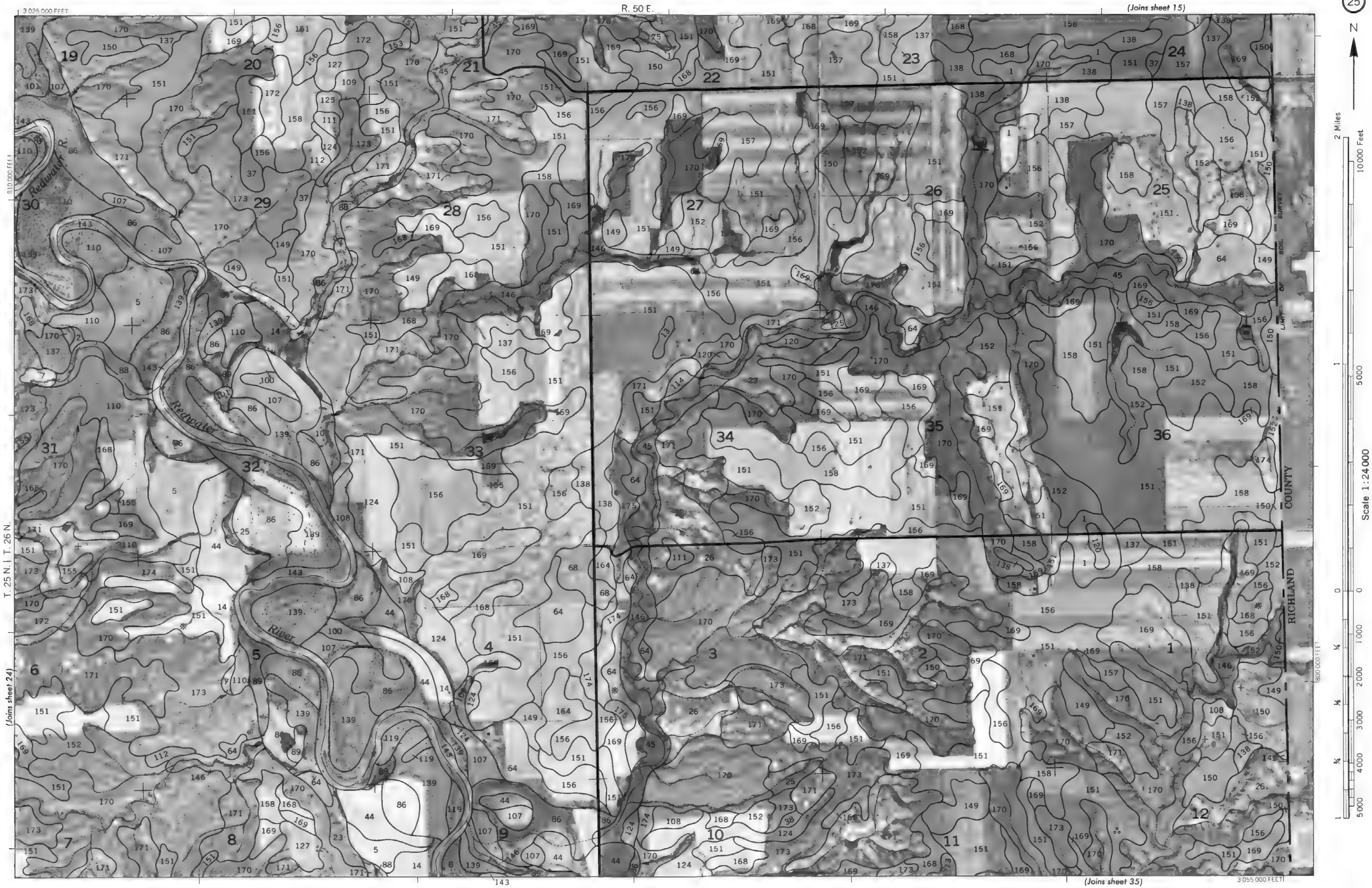
McCONE COUNTY, MONTANA — SHEET NUMBER 24

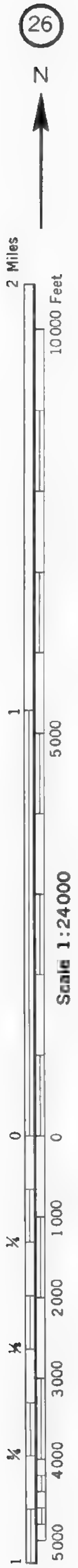


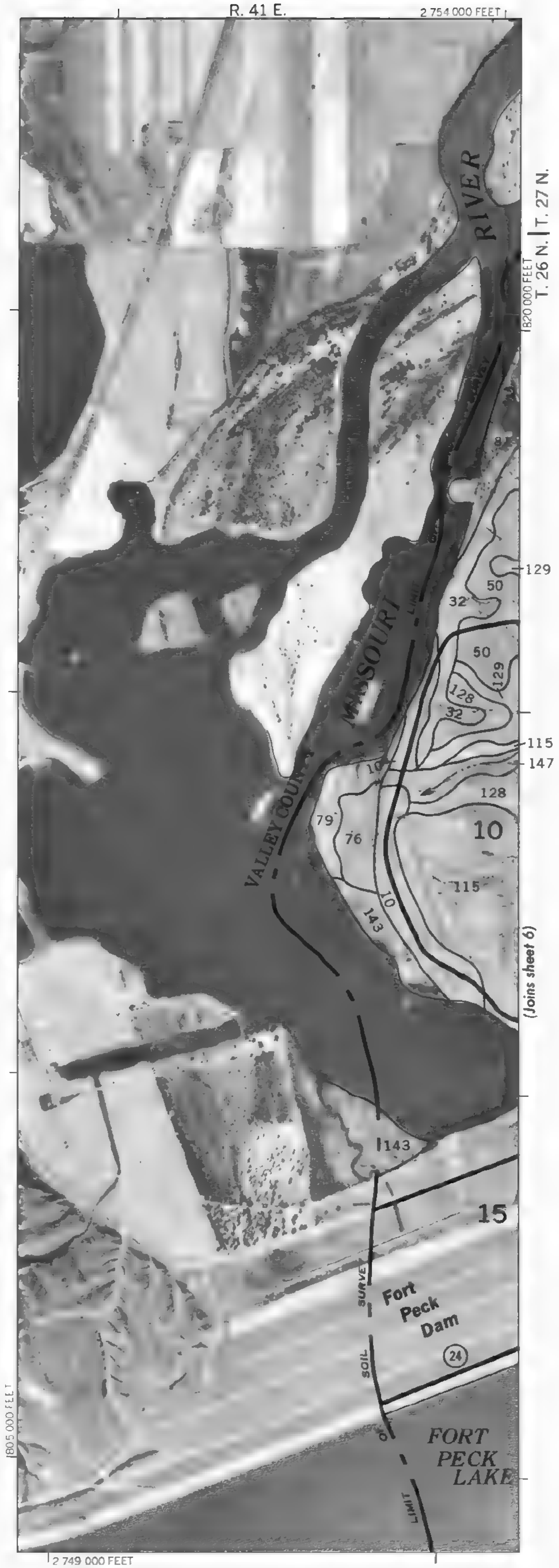


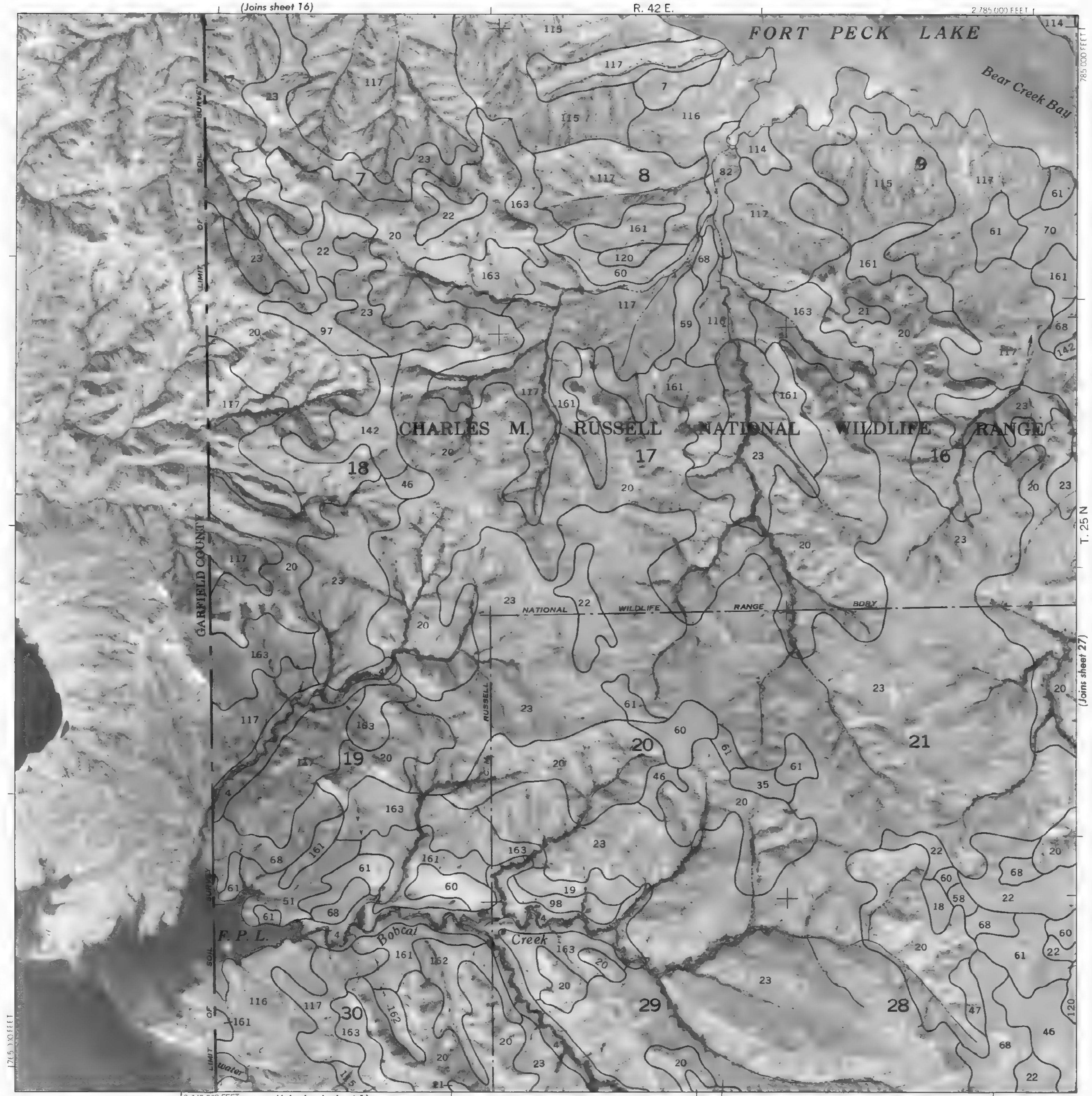
This map is compiled on [illegible] aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 25









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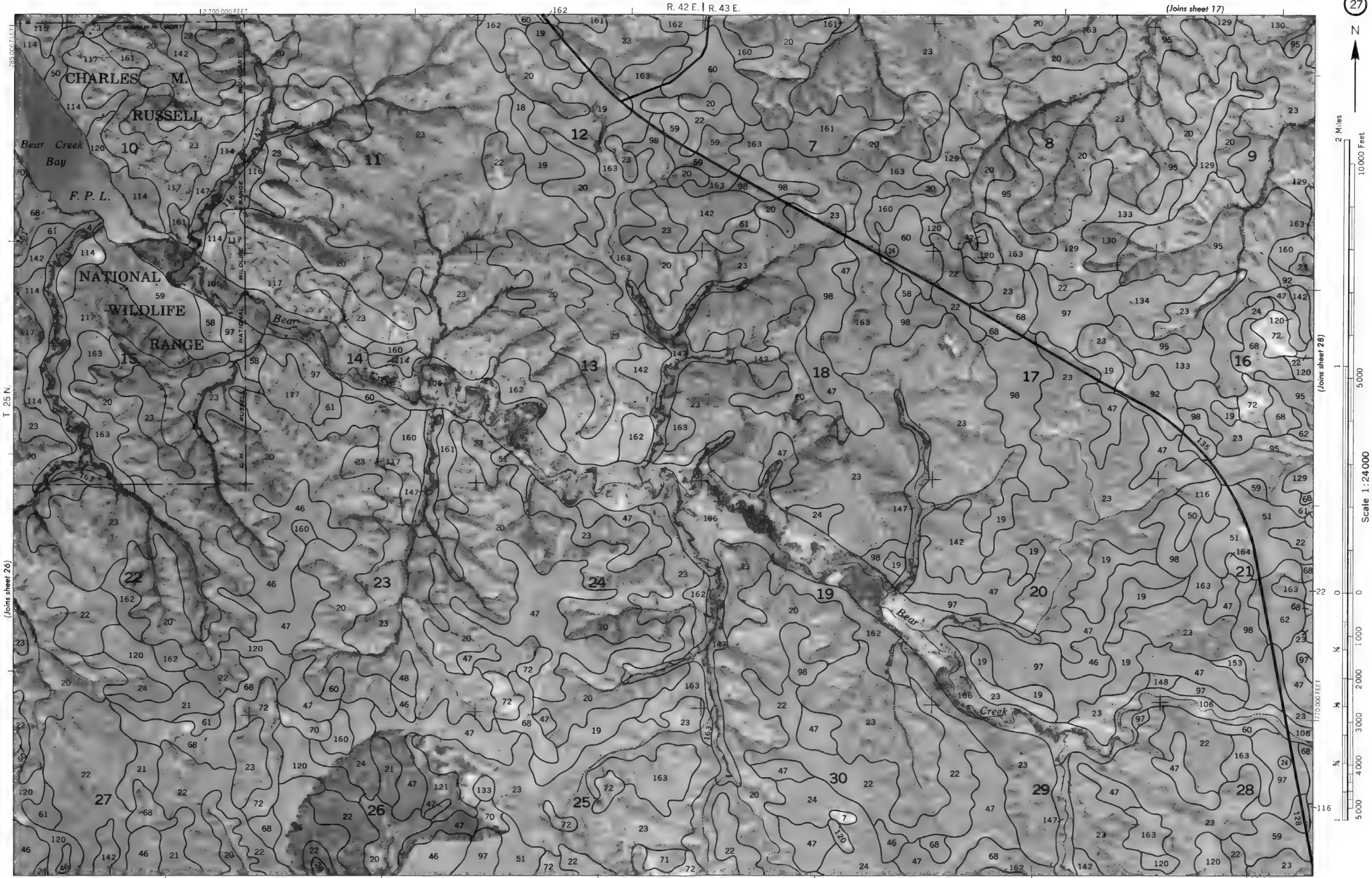
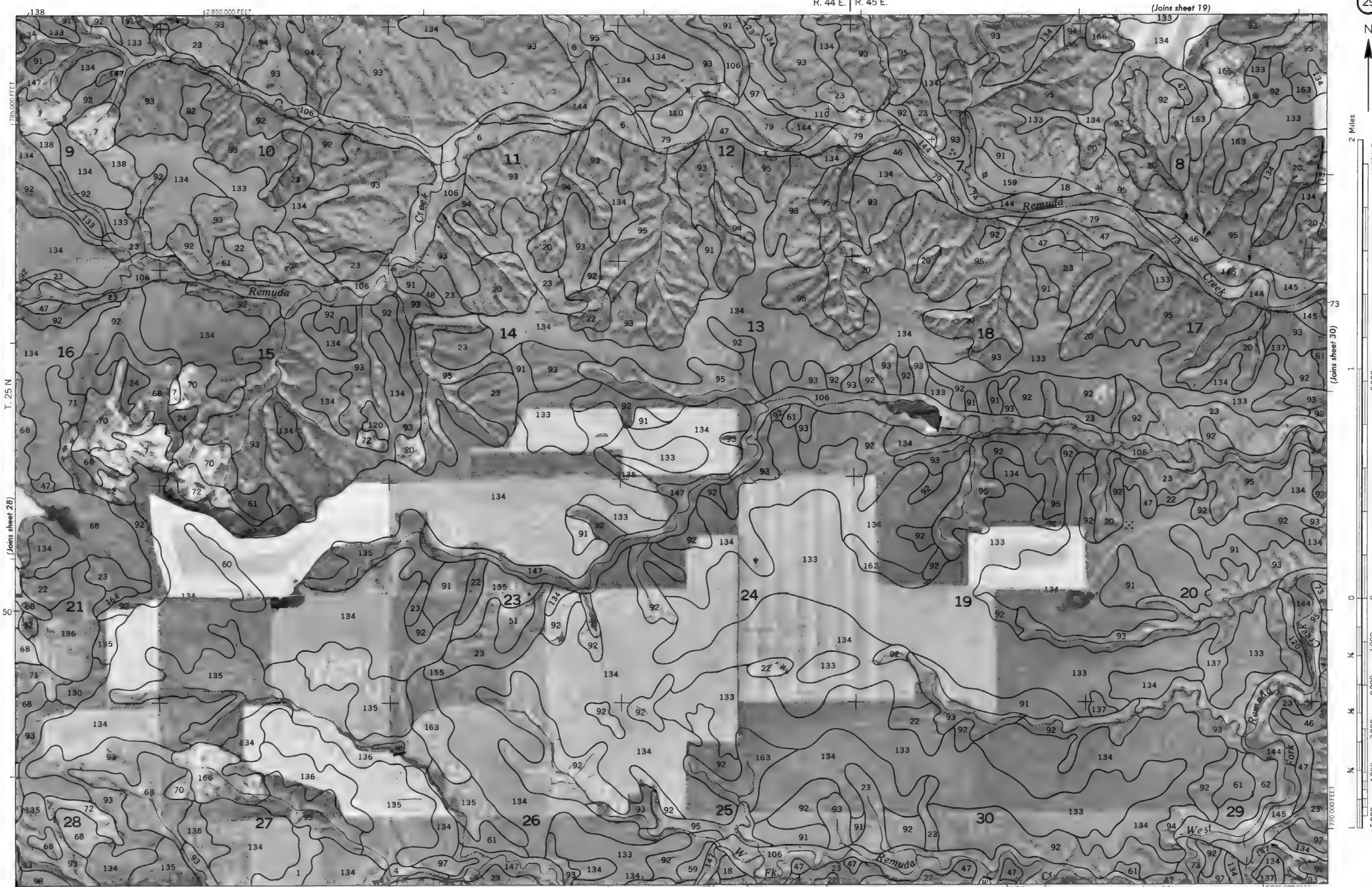

27
N
R. 42 E. | R. 43 E.
(Joins sheet 17)
(Joins sheet 28)
(Joins sheet 36)
(Joins sheet 26)
T. 25 N.
2 700 000 FEET
785 000 FEET
770 000 FEET
2 815 000 FEET
CHARLES M. RUSSELL NATIONAL WILDLIFE RANGE
Bear Creek Bay
F. P. L.
Bear Creek
C. M. RUSSELL NATIONAL WILDLIFE RANGE BOUNDARY
Scale 1:24 000
2 Miles
10000 Feet
1
5000
0
1000
2000
3000
4000
5000
½
¼
¾

This map is compiled on 19[illegible] aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

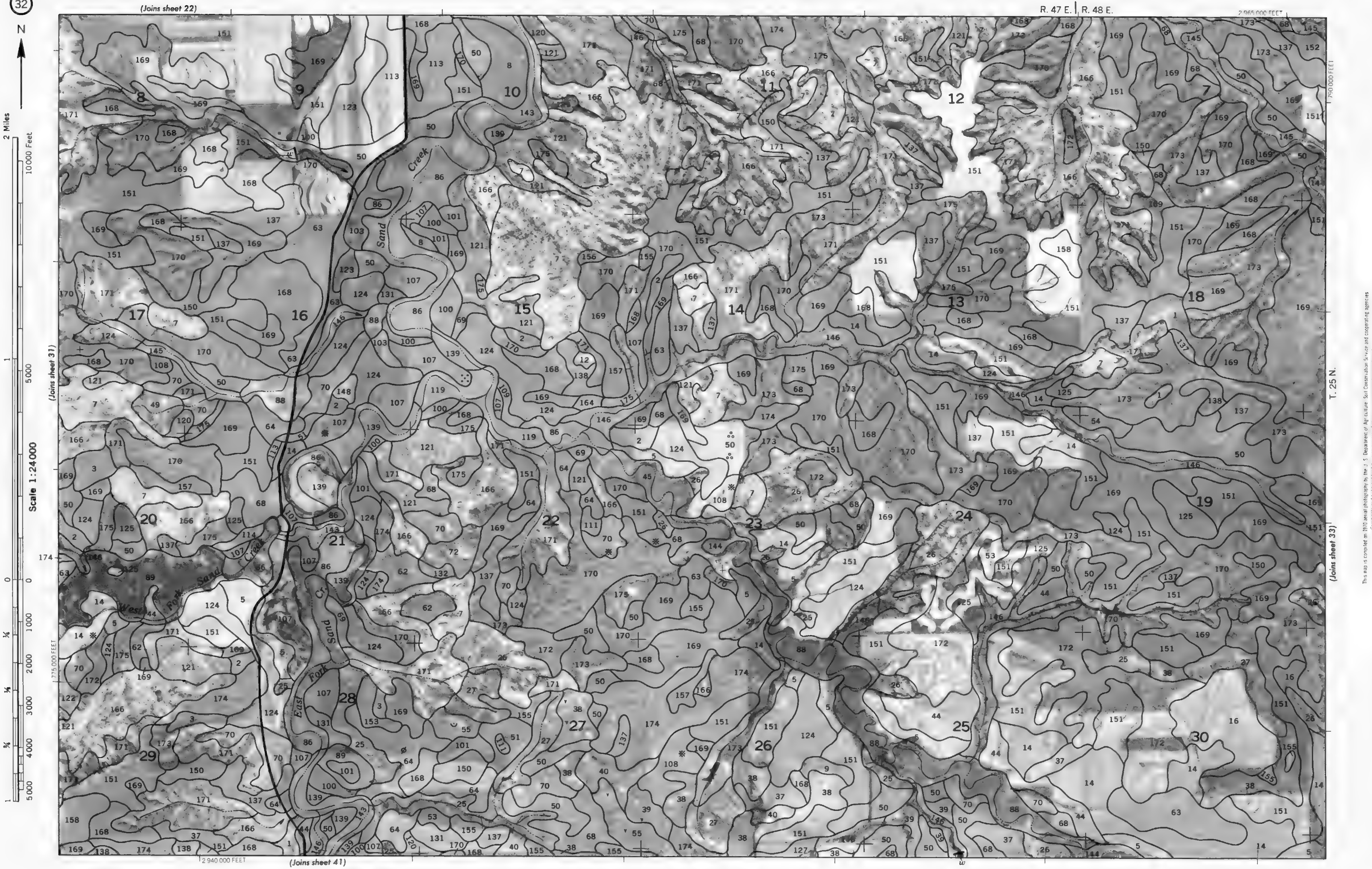
McCONE COUNTY, MONTANA — SHEET NUMBER 29



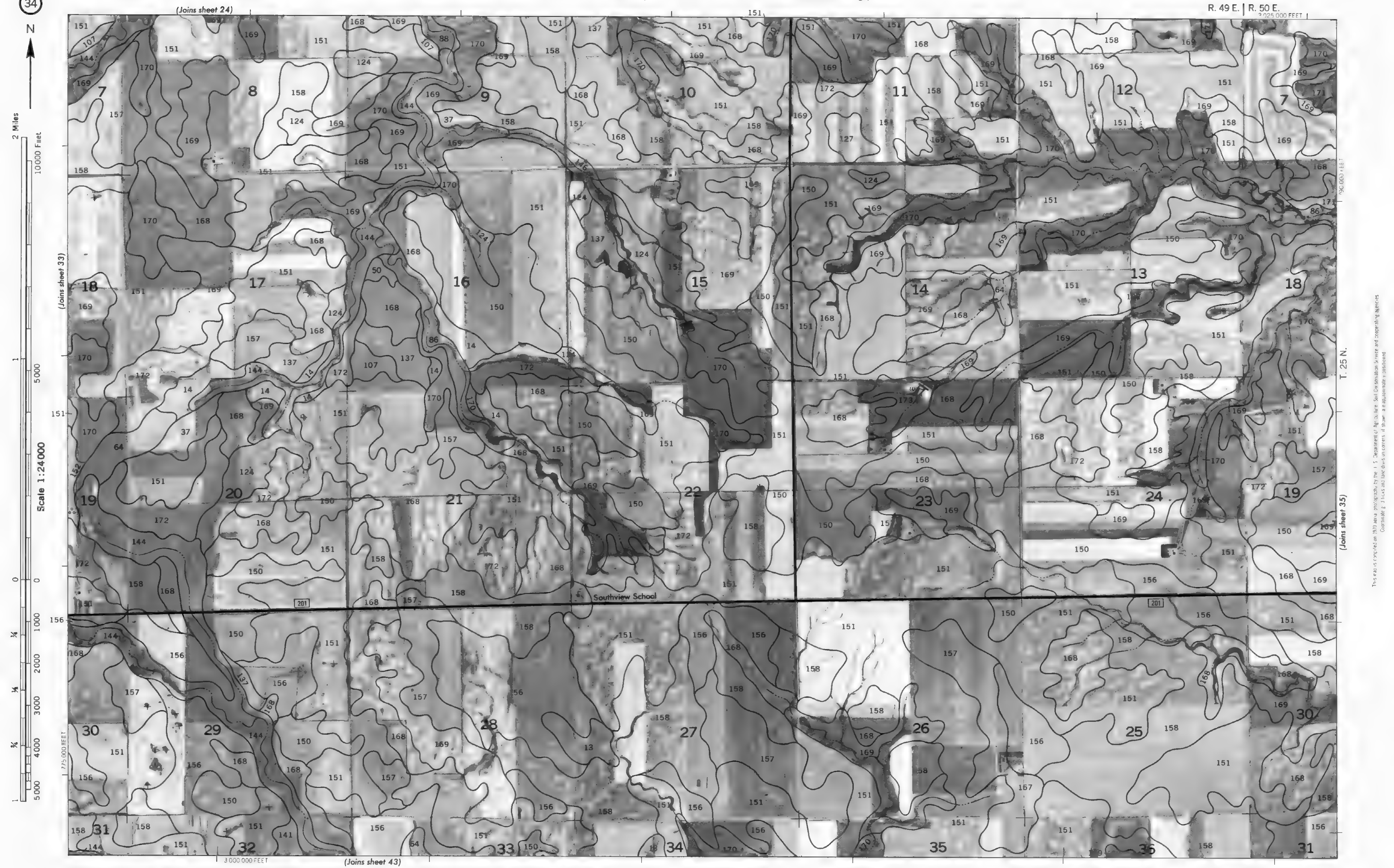
McCONE COUNTY, MONTANA — SHEET NUMBER 30

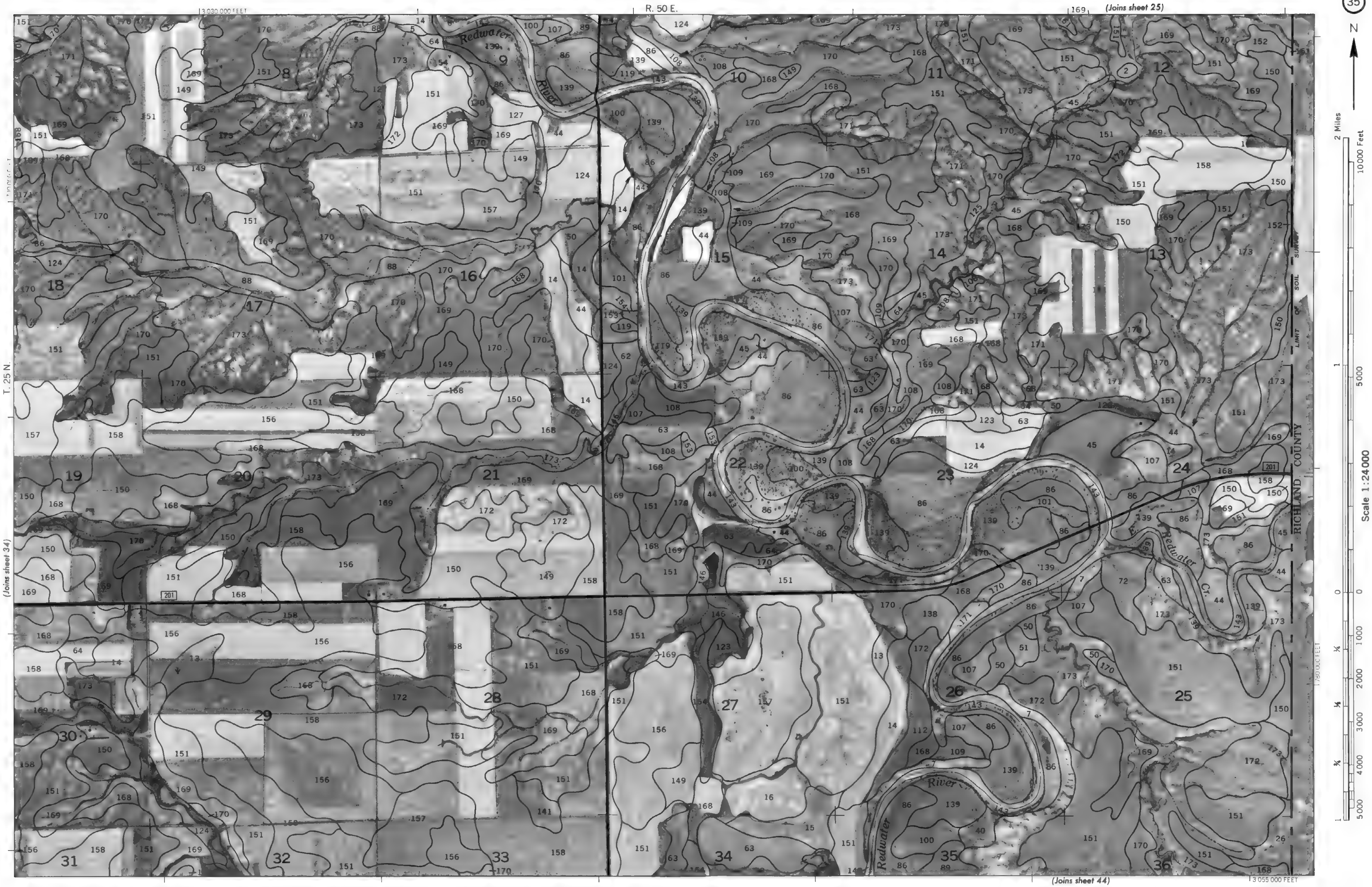
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


31
R. 46 E. | R. 47 E.
(Joins sheet 21)
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 40)
T. 25 N.
N
Reservoir
water
West Fork Sand Creek
Scale 1:24000
2 Miles
10000 Feet
5000
2935 000 FEET

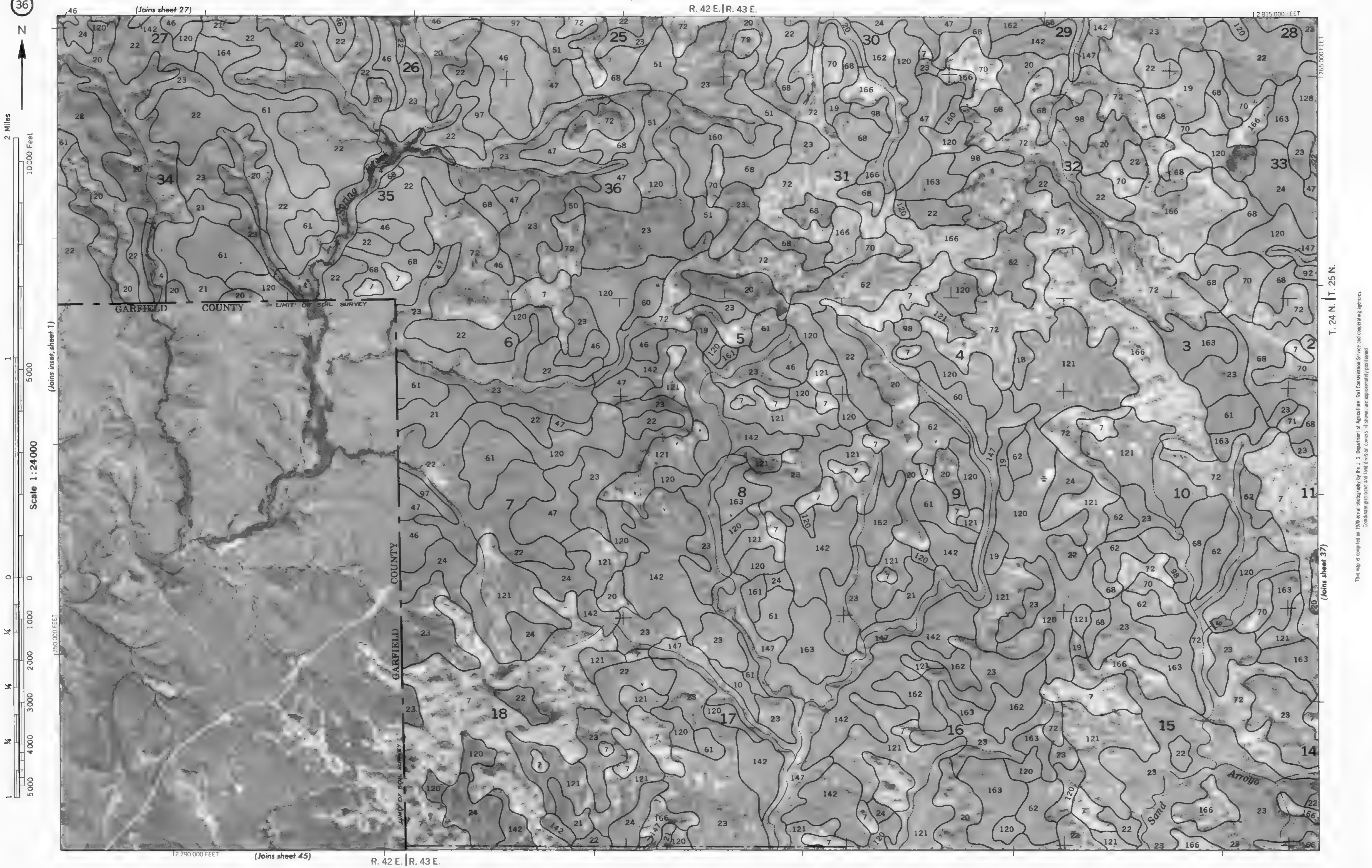

32
N
(Joins sheet 22)
R. 47 E.
R. 48 E.
2 965 000 FEET
790 000 FEET
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 41)
T. 25 N.
2 940 000 FEET
175 000 FEET
Scale 1:24 000
2 Miles
10000 Feet
5000
0
1000
2000
3000
4000
5000
1
¾
½
¼
Sand Creek
West Fork Sand Creek
East Fork Sand Cr.
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


33
(Joins sheet 23)
R. 48 E. | R. 49 E.
N
T. 25 N.
(Joins sheet 32)
(Joins sheet 34)
(Joins sheet 42)
2 970 000 FEET
290 000 FEET
1 775 000 FEET
2 995 000 FEET
Scale 1:24 000
2 Miles
1
0
10 000 Feet
5 000
0
1 Kilometer


34
N
2 Miles
10000 Feet
Scale 1:24000
(Joins sheet 24)
(Joins sheet 33)
(Joins sheet 35)
(Joins sheet 43)
R. 49 E. | R. 50 E.
T. 25 N.
Southview School
201
3 000 000 FEET
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

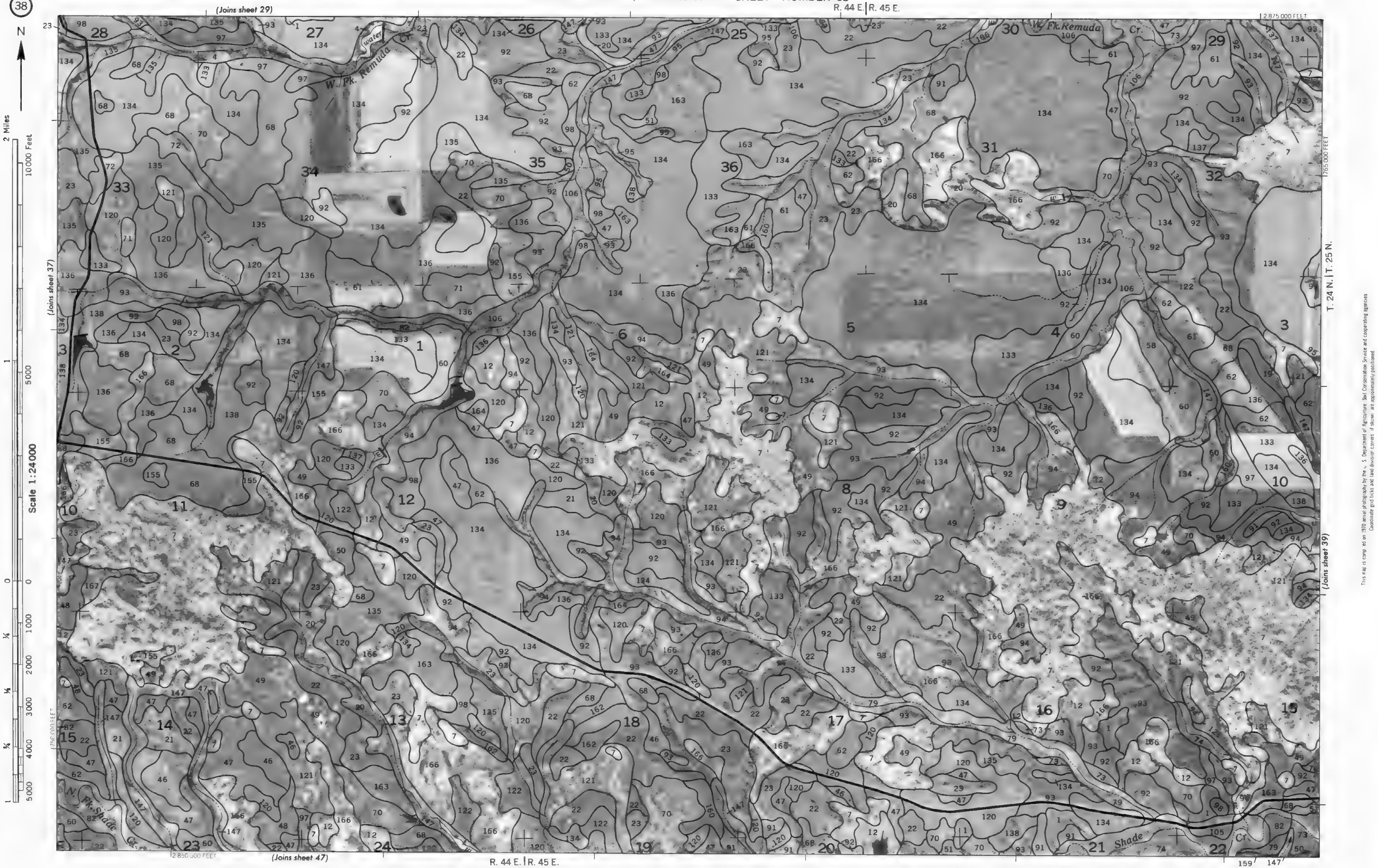


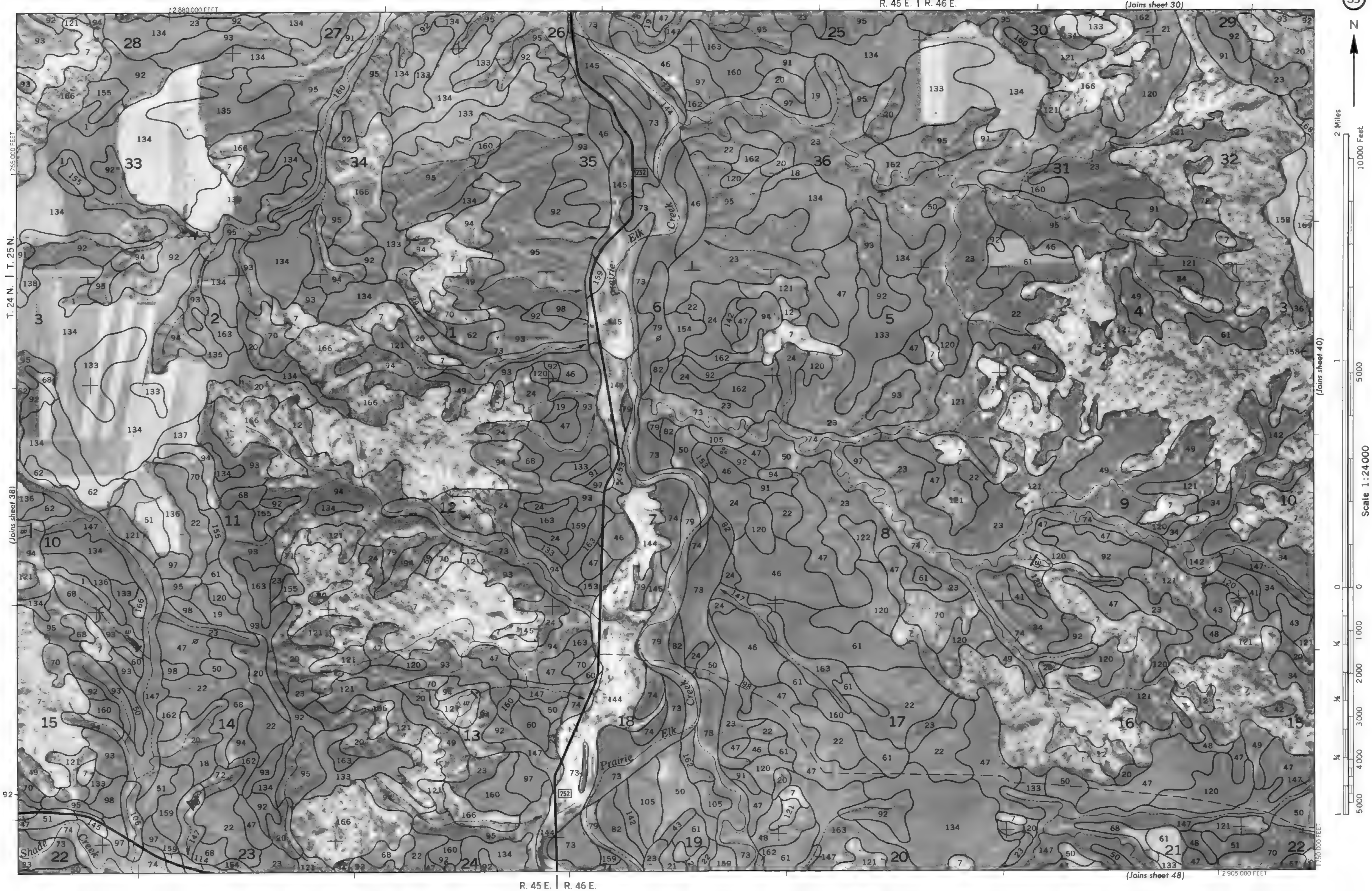
R. 50 E.
3 030 000 FEET
(Joins sheet 25)
(Joins sheet 34)
(Joins sheet 44)
3 055 000 FEET
T. 25 N.
Redwater River
E. Redwater Cr.
RICHLAND COUNTY
LIMIT OF SOIL SURVEY
N
2 Miles
10000 Feet
Scale 1:24000


36
N
2 Miles
10000 Feet
5000
0
1000
2000
3000
4000
5000
Scale 1:24000
(Joins sheet 27)
(Joins inset, sheet 1)
(Joins sheet 37)
(Joins sheet 45)
R. 42 E. | R. 43 E.
T. 25 N.
T. 24 N.
2 815 000 FEET
765 000 FEET
750 000 FEET
2 790 000 FEET
GARFIELD COUNTY
LIMIT OF SOIL SURVEY
Spring Creek
Sand Arroyo
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


37
N
R. 43 E. | R. 44 E.
(Joins sheet 28)
(Joins sheet 38)
(Joins sheet 36)
(Joins sheet 46)
T. 24 N. | T. 25 N.
2 820 000 FEET
2 845 000 FEET
765 000 FEET
750 000 FEET
Bear Cr.
N. Fk.
Shade Cr.
Scale 1:24000
2 Miles
10000 Feet
1
5000
0
0
1000
2000
3000
4000
5000

McCONE COUNTY, MONTANA — SHEET NUMBER 38




39
N
R. 45 E. | R. 46 E.
(Joins sheet 30)
(Joins sheet 38)
(Joins sheet 40)
(Joins sheet 48)
T. 24 N. | T. 25 N.
Elk
Prairie
Creek
Shade
252
2 Miles
10000 Feet
Scale 1:24000
2 880 000 FEET
2 905 000 FEET
765 000 FEET
750 000 FEET

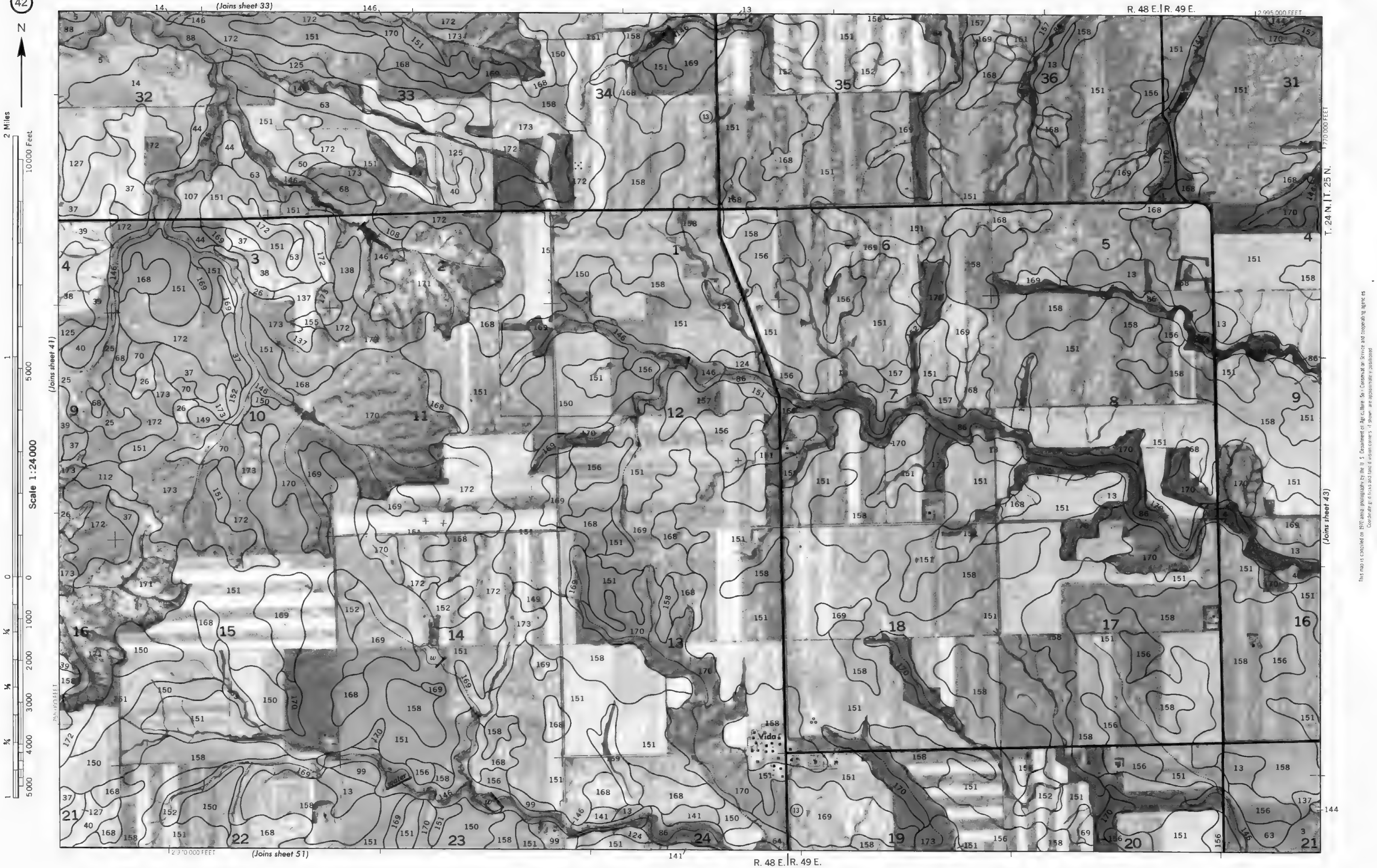
40

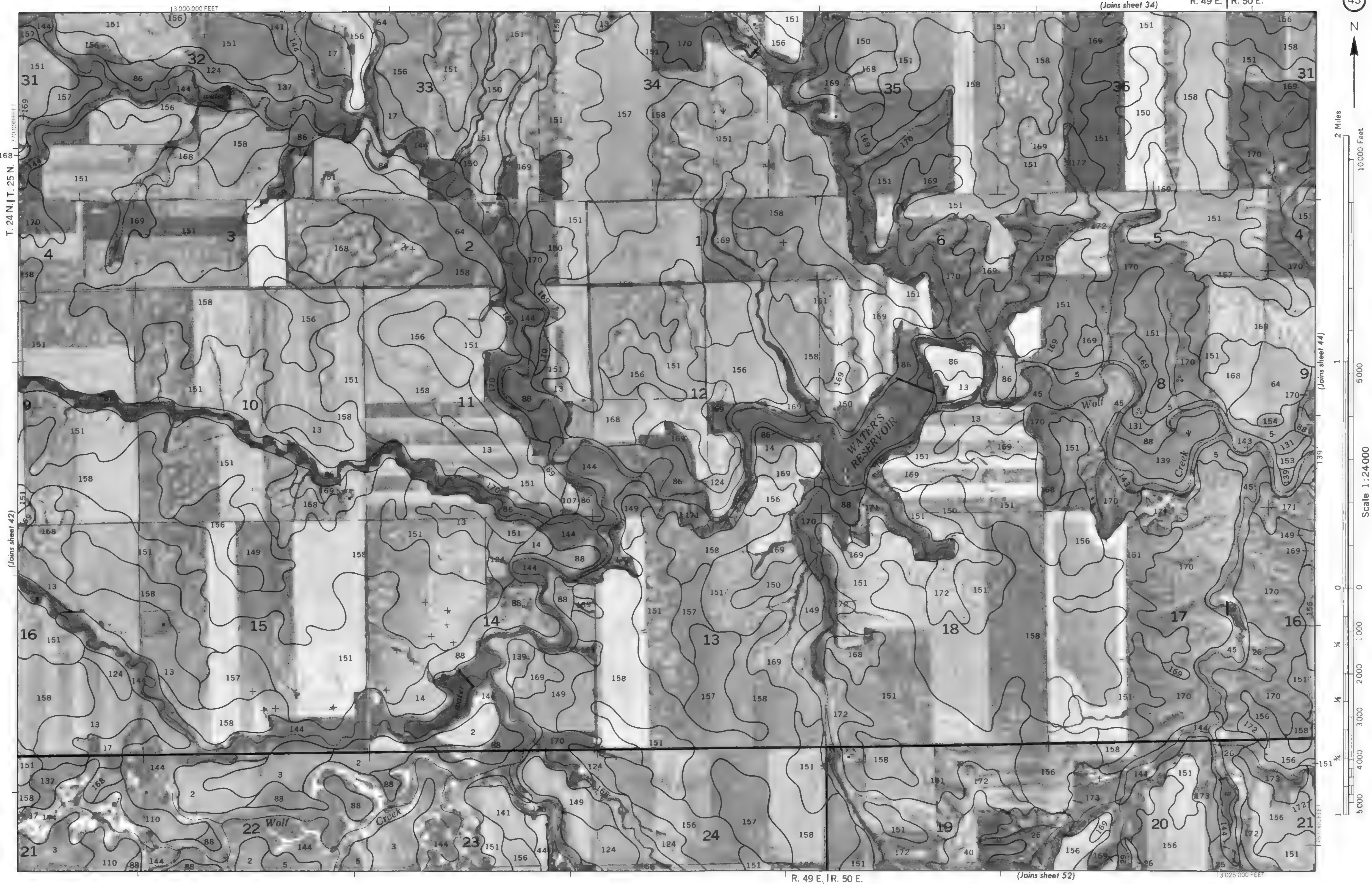
McCONE COUNTY, MONTANA — SHEET NUMBER 40

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

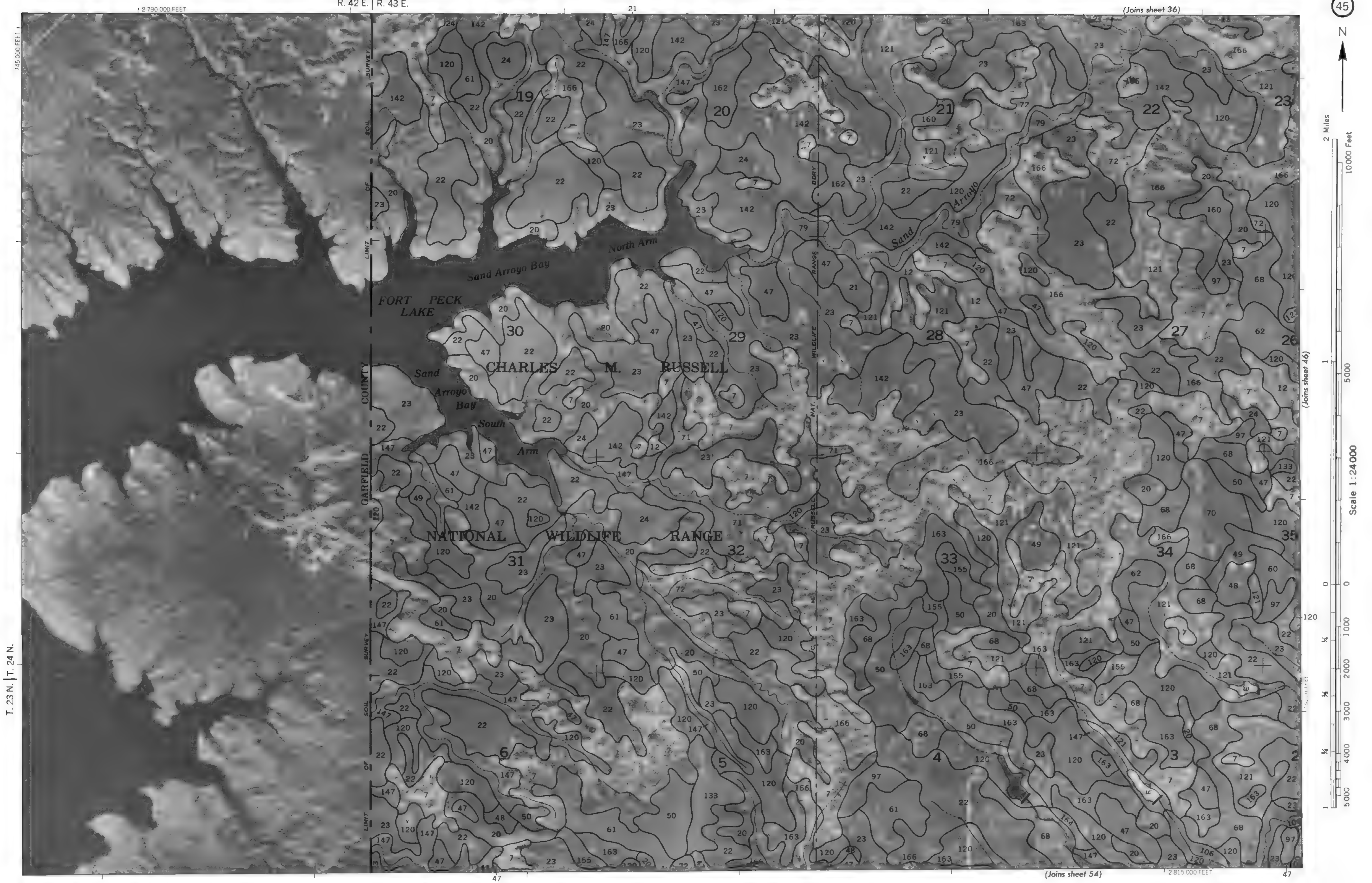

R. 47 E. | R. 48 E.
(Joins sheet 32)
(Joins sheet 40)
(Joins sheet 42)
(Joins sheet 50)
T. 24 N. | T. 25 N.
N
East Fork Sand Creek
Coal Creek
Scale 1:24 000
2 Miles
10000 Feet
5000
1000
2000
3000
4000
0

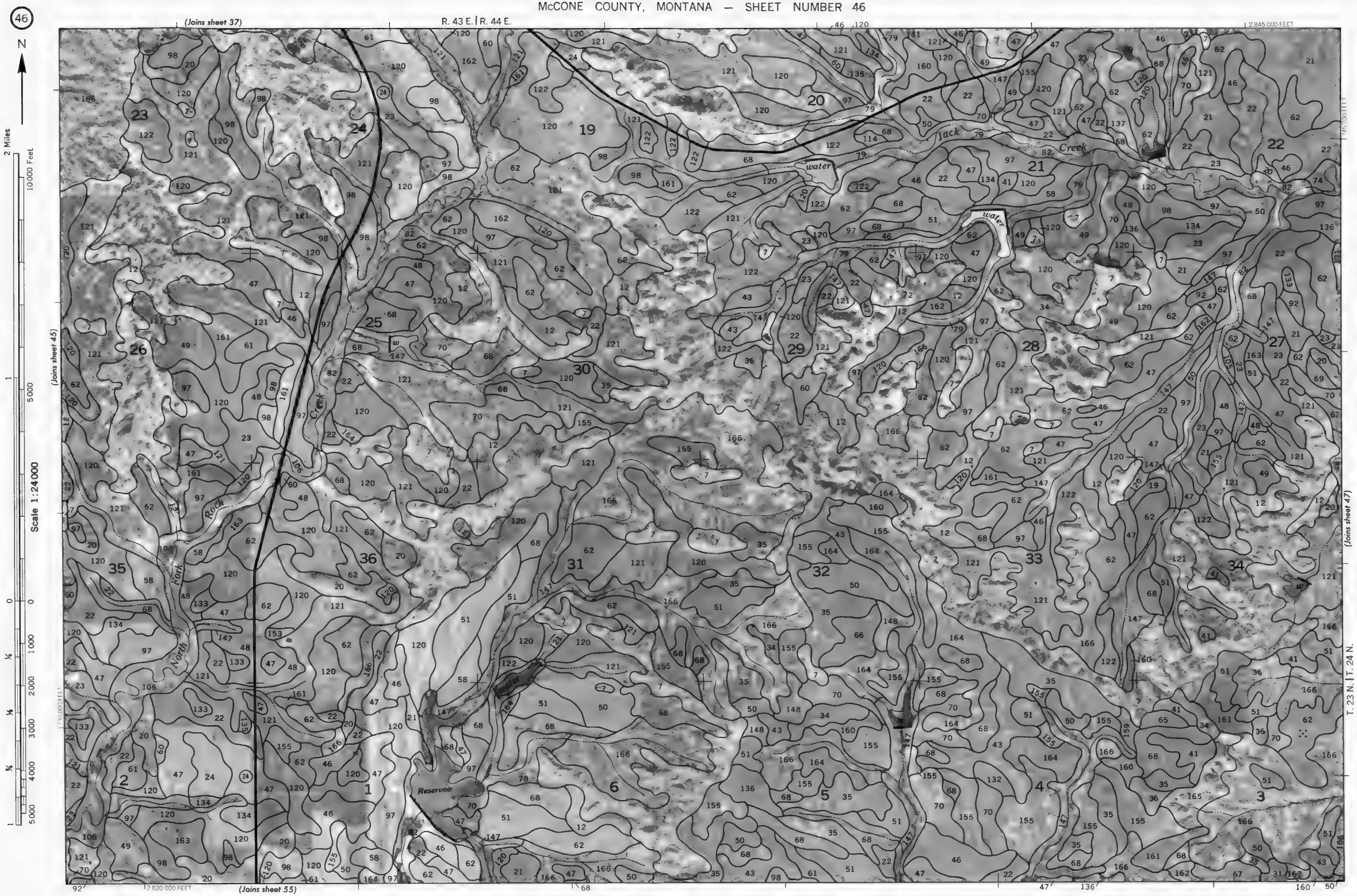
McCONE COUNTY, MONTANA — SHEET NUMBER 42



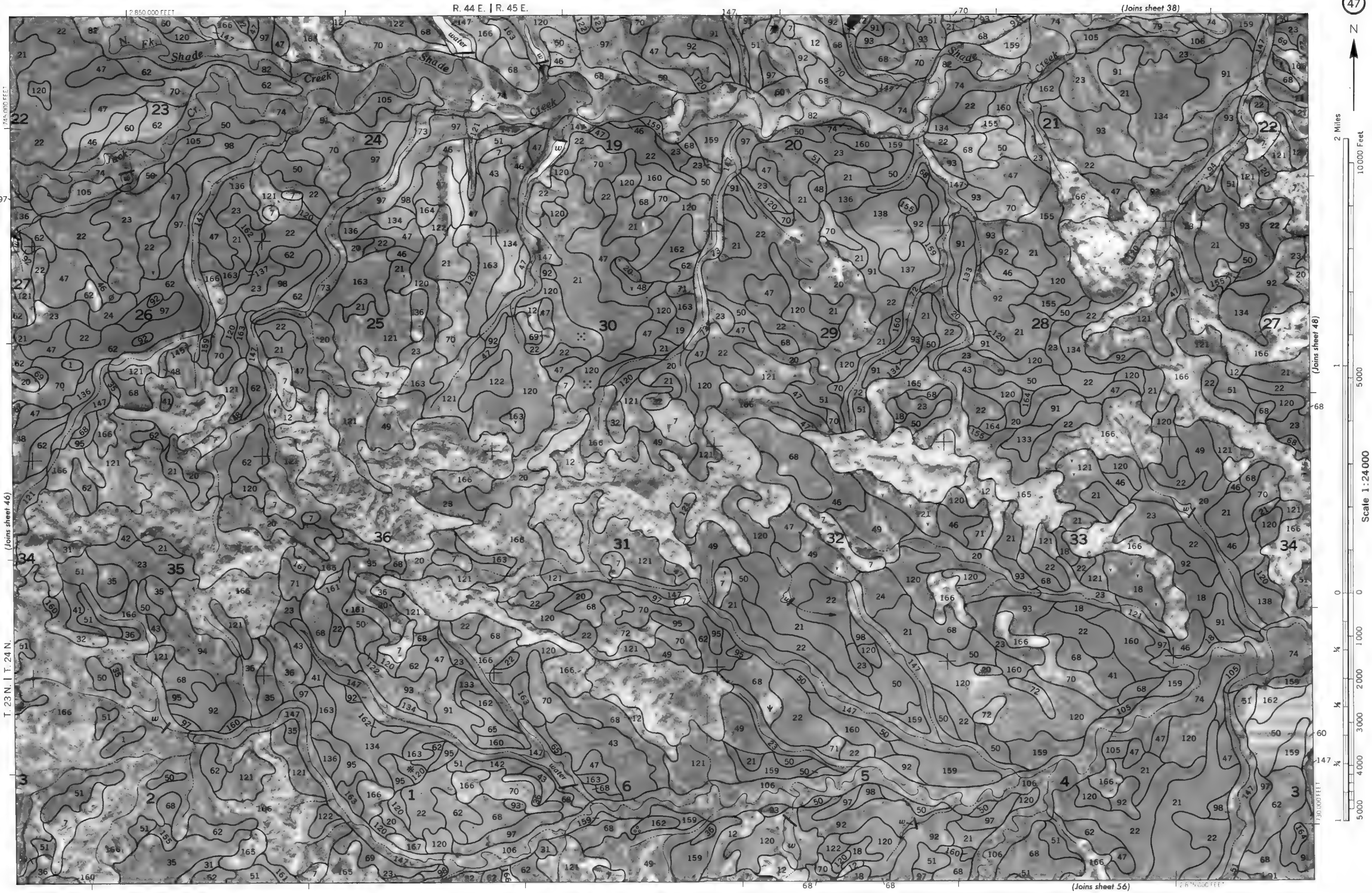

(Joins sheet 34)
R. 49 E. | R. 50 E.
3 000 000 FEET
T. 24 N. | T. 25 N.
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 52)
R. 49 E. | R. 50 E.
3 025 000 FEET
WATER'S RESERVOIR
Wolf Creek
Wolf
Creek
water
N
2 Miles
10 000 Feet
Scale 1:24 000

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

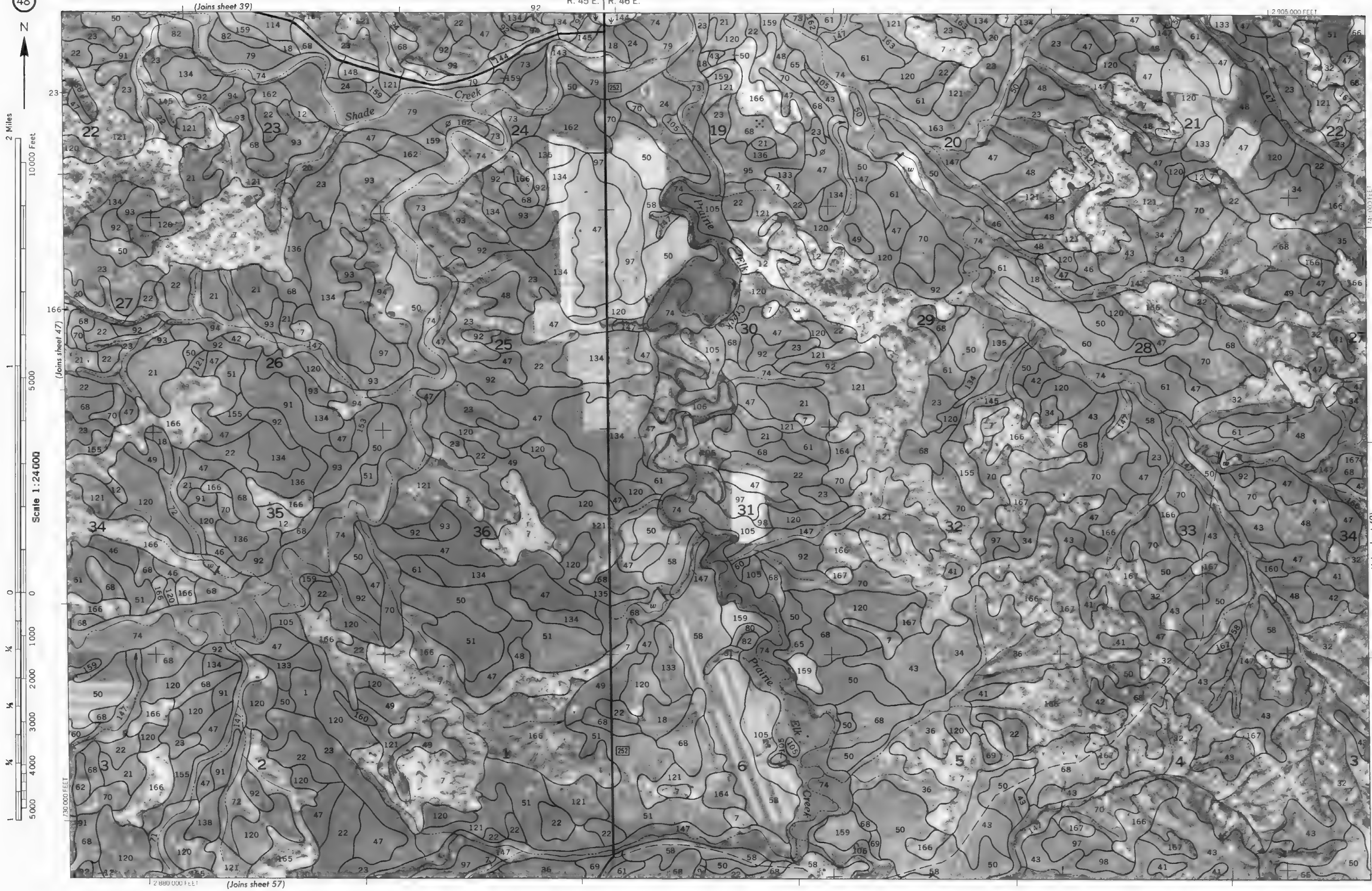

45
R. 42 E. | R. 43 E.
2 790 000 FEET
(Joins sheet 36)
(Joins sheet 46)
(Joins sheet 54)
2 815 000 FEET
FORT PECK LAKE
Sand Arroyo Bay
North Arm
South Arm
Sand Arroyo
CHARLES M. RUSSELL
NATIONAL WILDLIFE RANGE
GARFIELD COUNTY
SOIL SURVEY LIMIT
T. 23 N. | T. 24 N.
N
Scale 1:24 000
2 Miles
10000 Feet



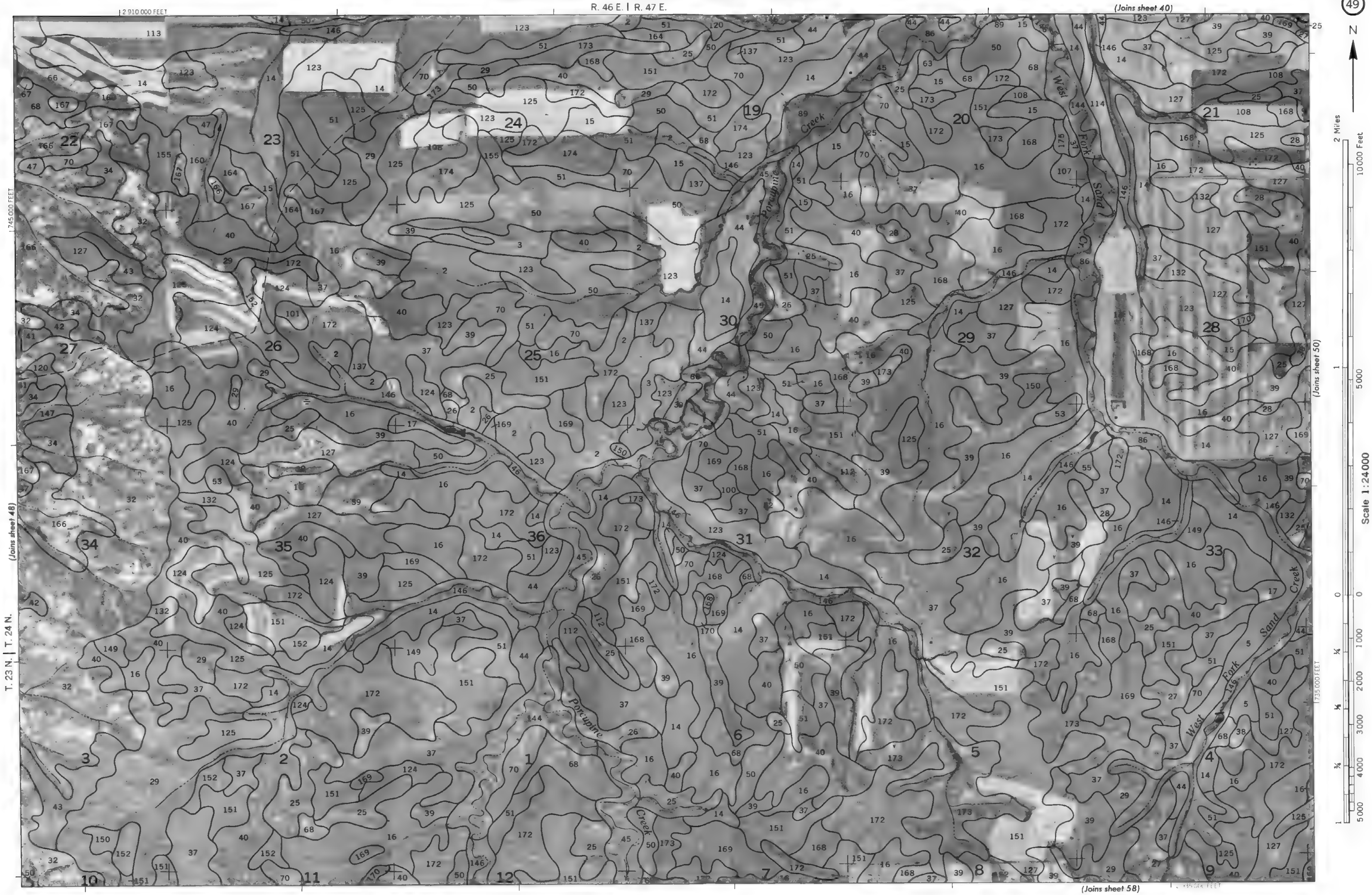
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



47
N
(Joins sheet 38)
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 56)
R. 44 E. | R. 45 E.
T. 23 N. | T. 24 N.
2 850 000 FEET
N. Fk. Shade Creek
Shade Creek
Jack Cr.
water
Scale 1:24 000
2 Miles
10000 Feet



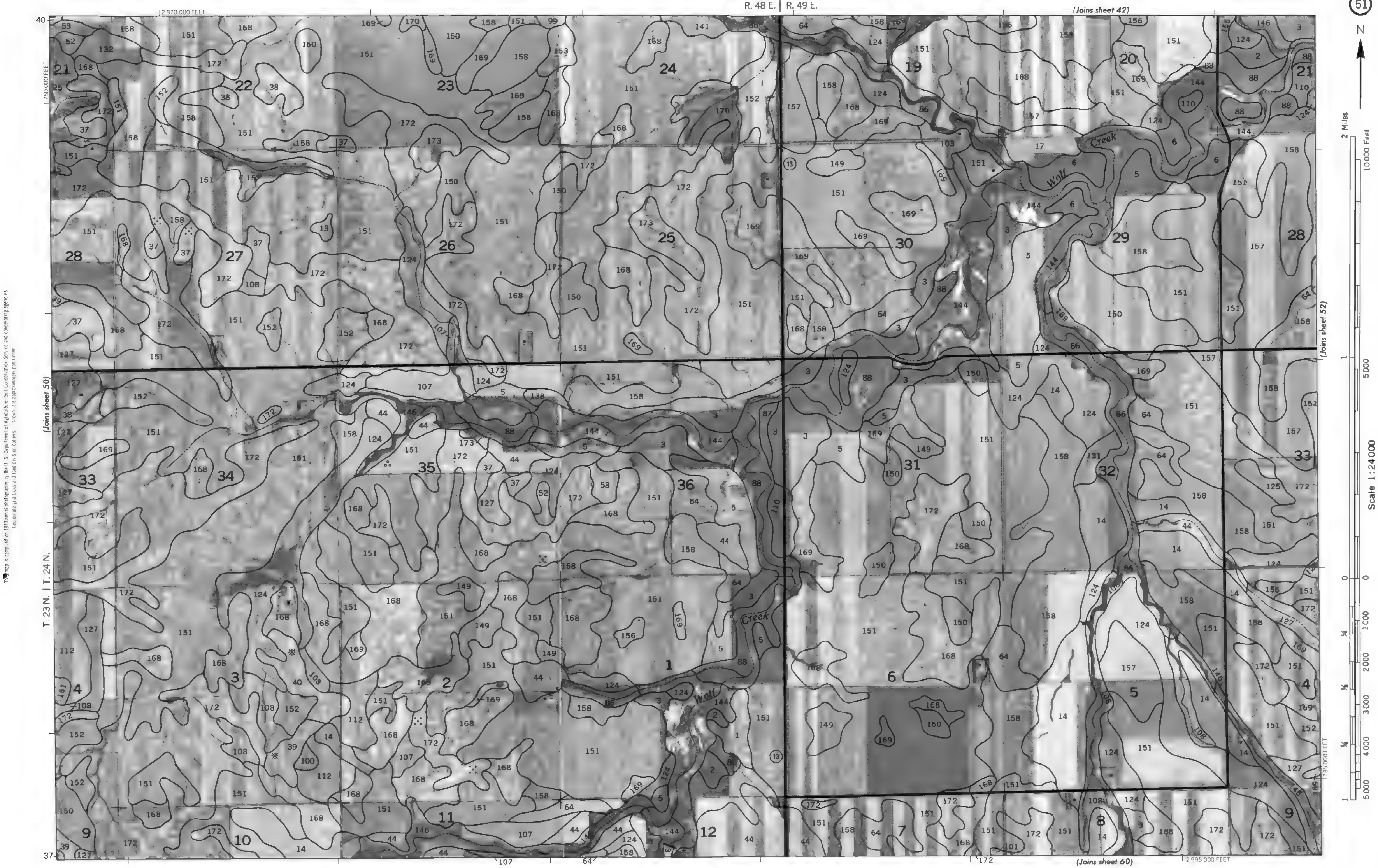
This map is compiled on 1978 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


R. 46 E. | R. 47 E.
2 910 000 FEET
745 000 FEET
735 000 FEET
(Joins sheet 40)
(Joins sheet 48)
(Joins sheet 50)
(Joins sheet 58)
T. 23 N. | T. 24 N.
49
N
Porcupine Creek
West Fork Sand Creek
Sand Creek
2 Miles
10000 Feet
Scale 1:24000

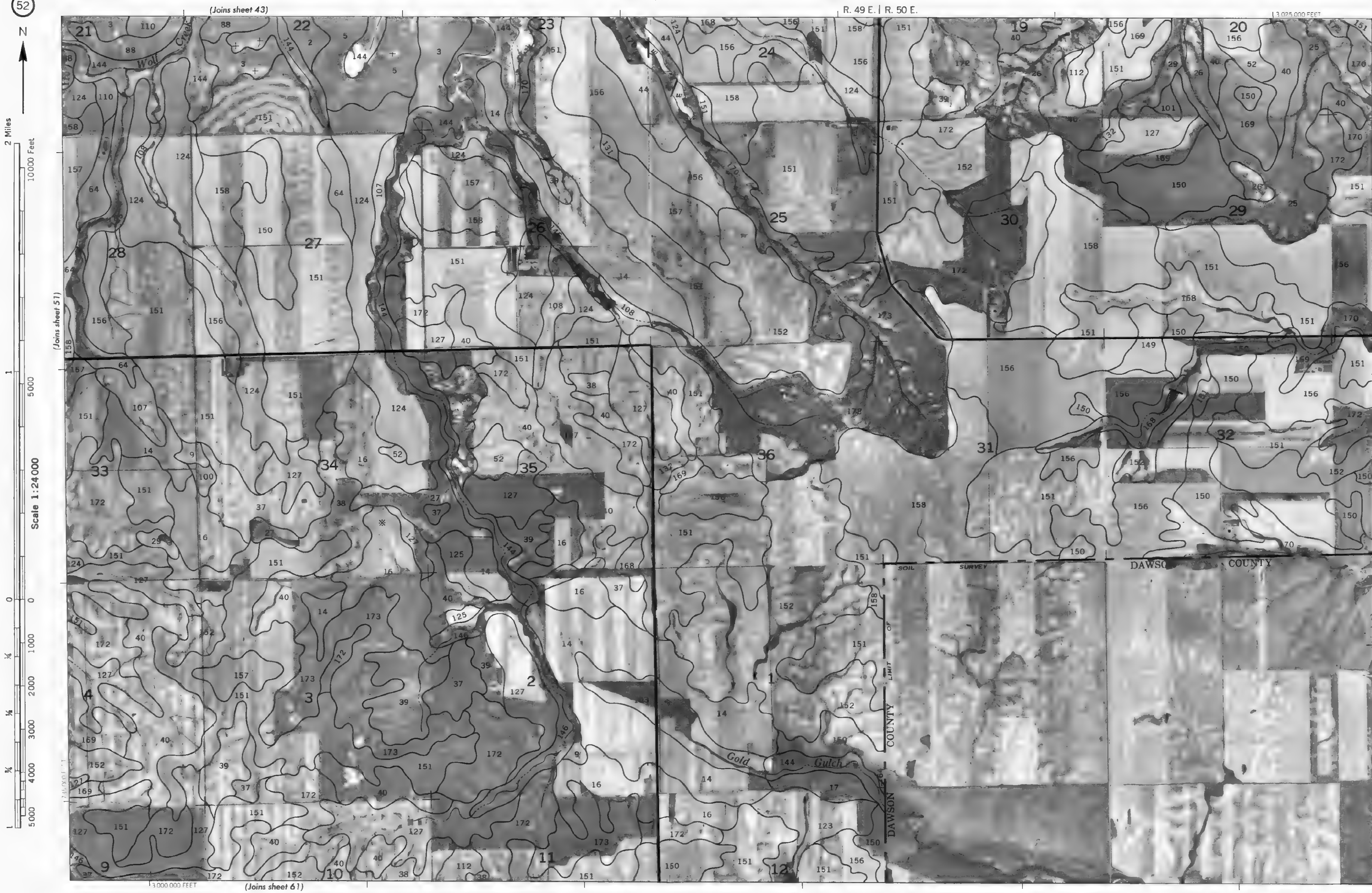
McCONE COUNTY, MONTANA — SHEET NUMBER 50

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 51

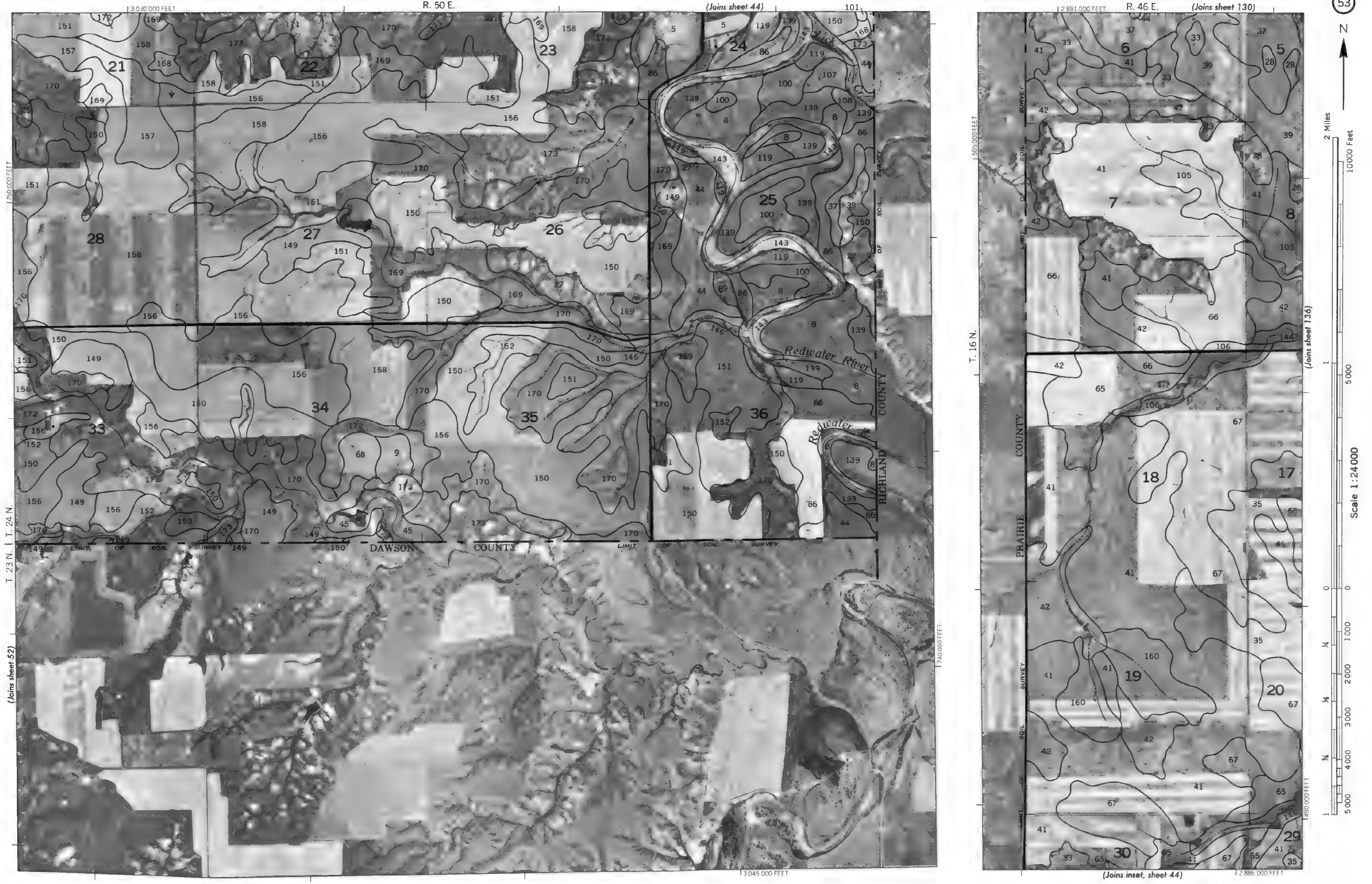


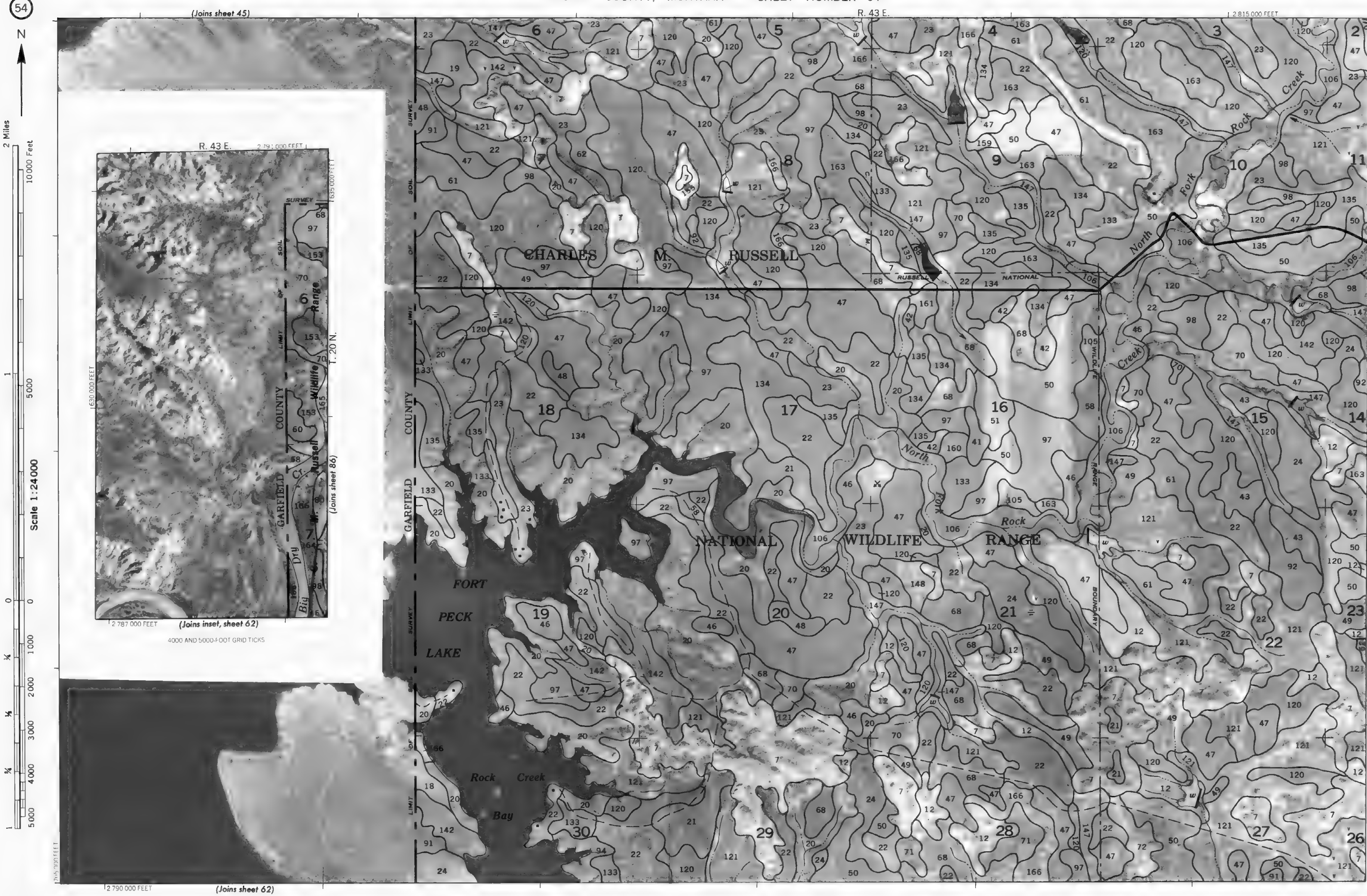
McCONE COUNTY, MONTANA — SHEET NUMBER 52



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

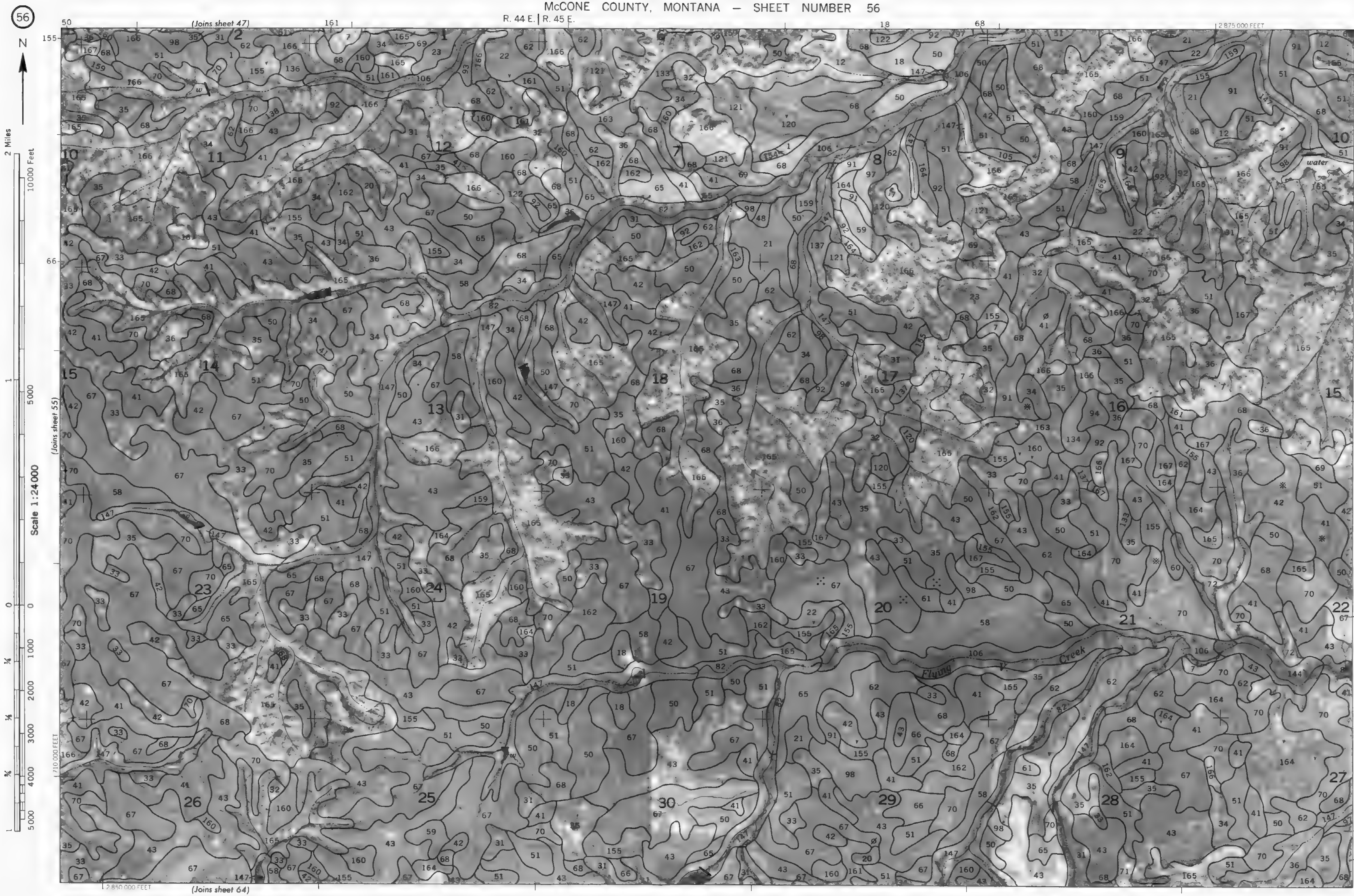
McCONE COUNTY, MONTANA — SHEET NUMBER 53





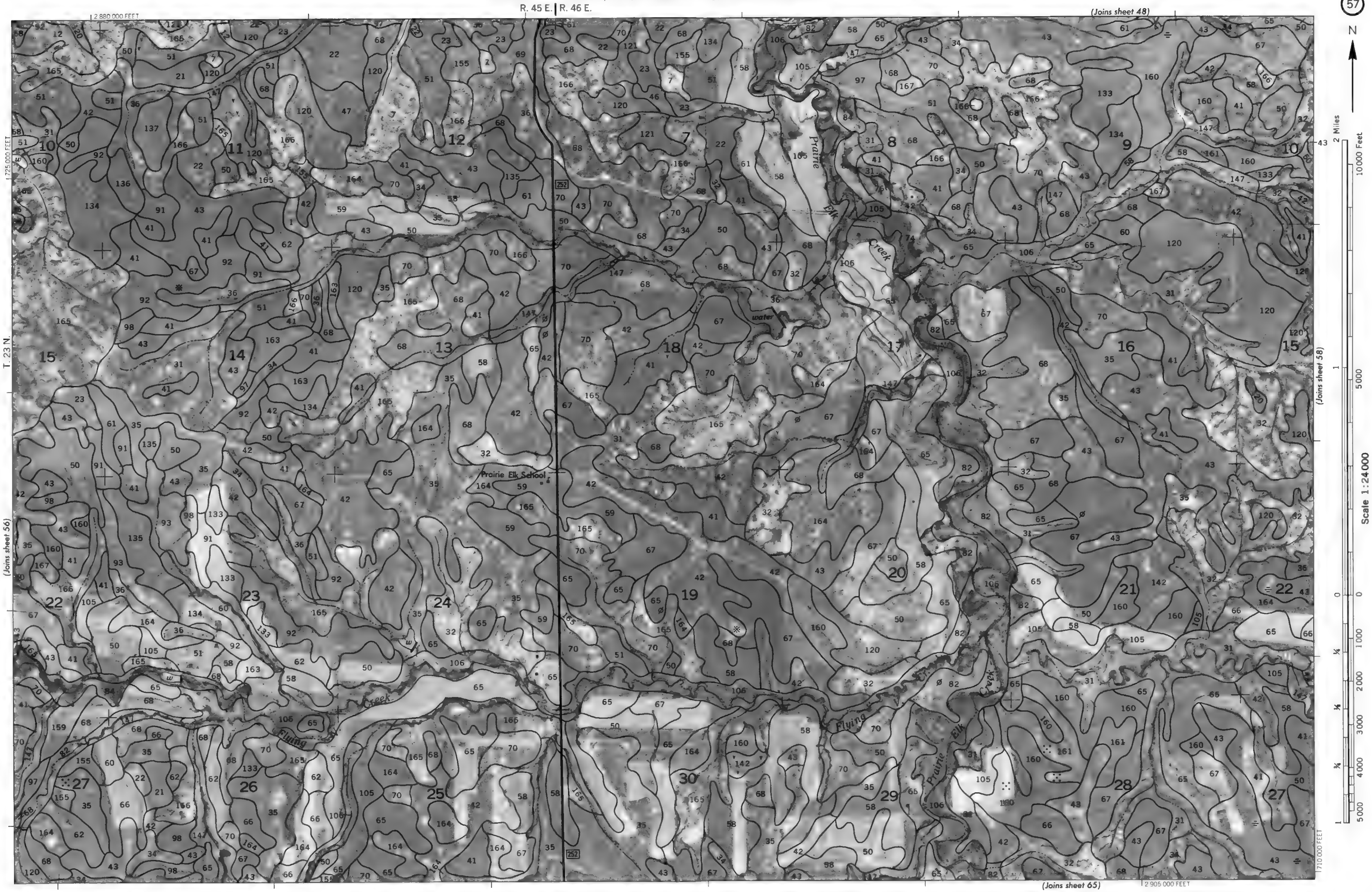
54
N
(Joins sheet 45)
R. 43 E.
2 815 000 FEET
CHARLES M. RUSSELL NATIONAL WILDLIFE RANGE
GARFIELD COUNTY SOIL SURVEY LIMIT
FORT PECK LAKE
Rock Creek Bay
North Fork Rock Creek
T. 23 N.
(Joins sheet 55)
2 790 000 FEET
(Joins sheet 62)
R. 43 E.
T. 20 N.
Big Dry
(Joins sheet 86)
2 787 000 FEET
(Joins inset, sheet 62)
4000 AND 5000-FOOT GRID TICKS
Scale 1:24 000
2 Miles
10 000 Feet

55
(Joins sheet 46)
(Joins sheet 56)
(Joins sheet 63)
(Joins sheet 54)
R. 43 E. | R. 44 E.
T. 23 N.
2 820 000 FEET
2 845 000 FEET
725 000 FEET
710 000 FEET
N
Scale 1:24000
2 Miles
10000 Feet
5000
Rock Creek
N. Branch S. Fork



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

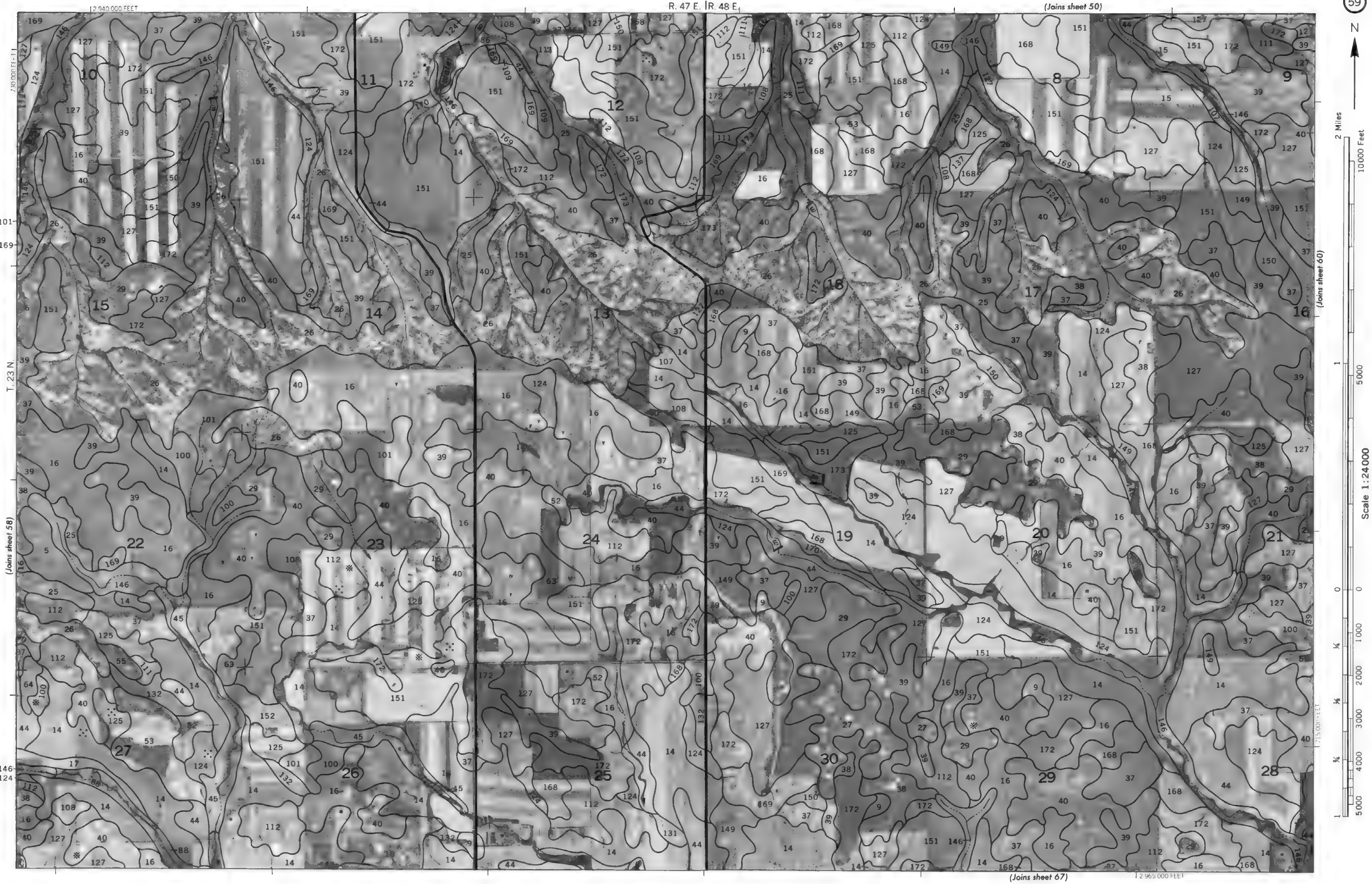
McCONE COUNTY, MONTANA — SHEET NUMBER 57



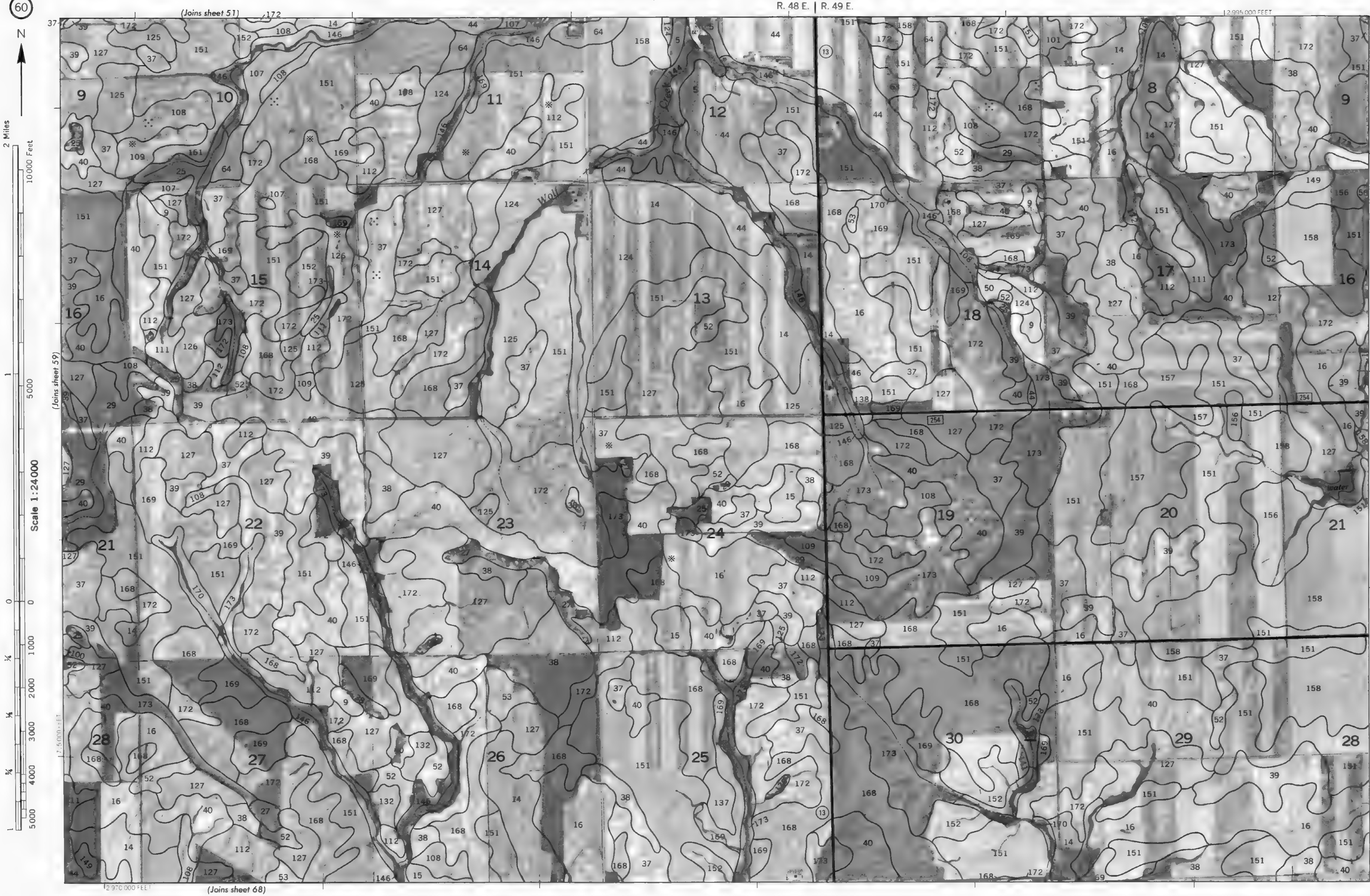
McCONE COUNTY, MONTANA — SHEET NUMBER 58

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

59



This map is compiled on 1978 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


60
N
R. 48 E. | R. 49 E.
(Joins sheet 51)
(Joins sheet 59)
(Joins sheet 61)
(Joins sheet 68)
T. 23 N.
Wolf
Creek
water
2 Miles
10000 Feet
5000
Scale 1:24000
2 970 000 FEET
2 995 000 FEET

N

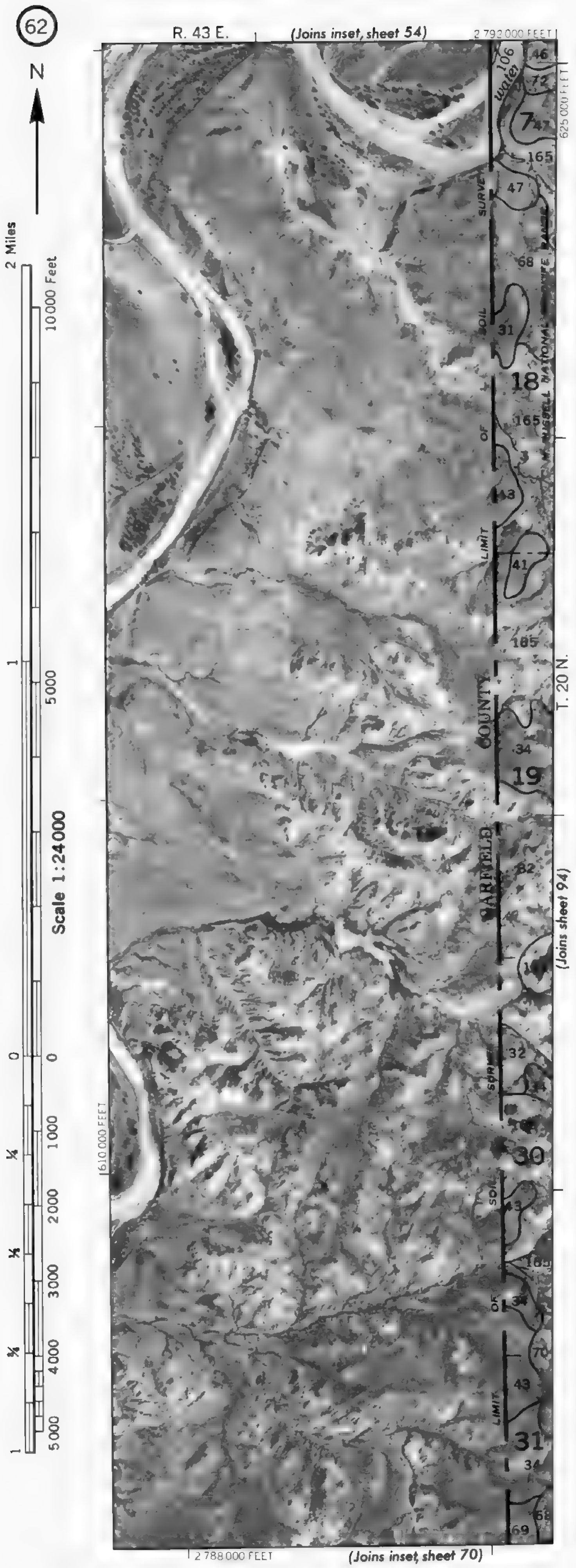
Scale 1:24 000

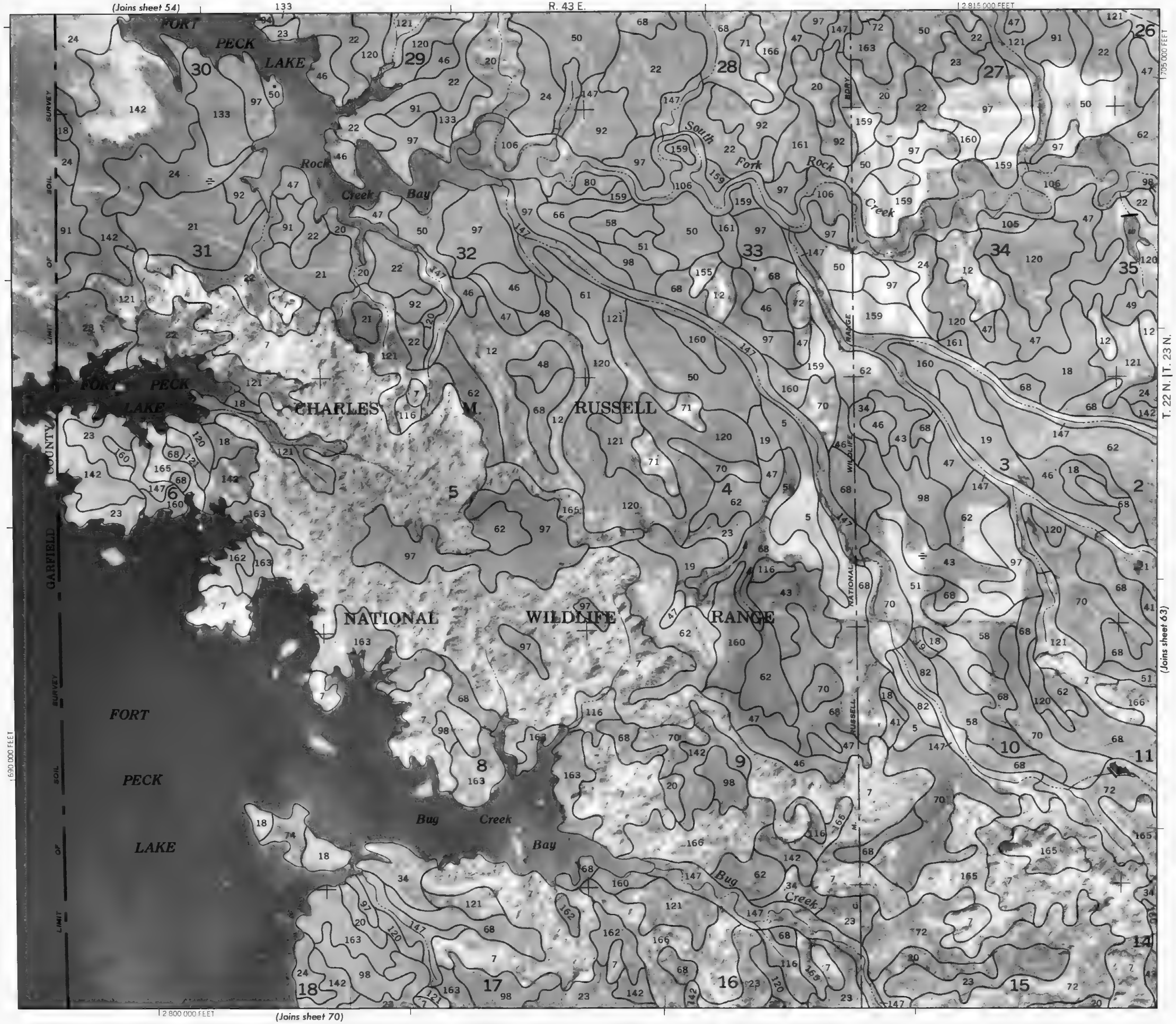
2 Miles
1
0
¼
½
¾
1

10 000 Feet
5000
0

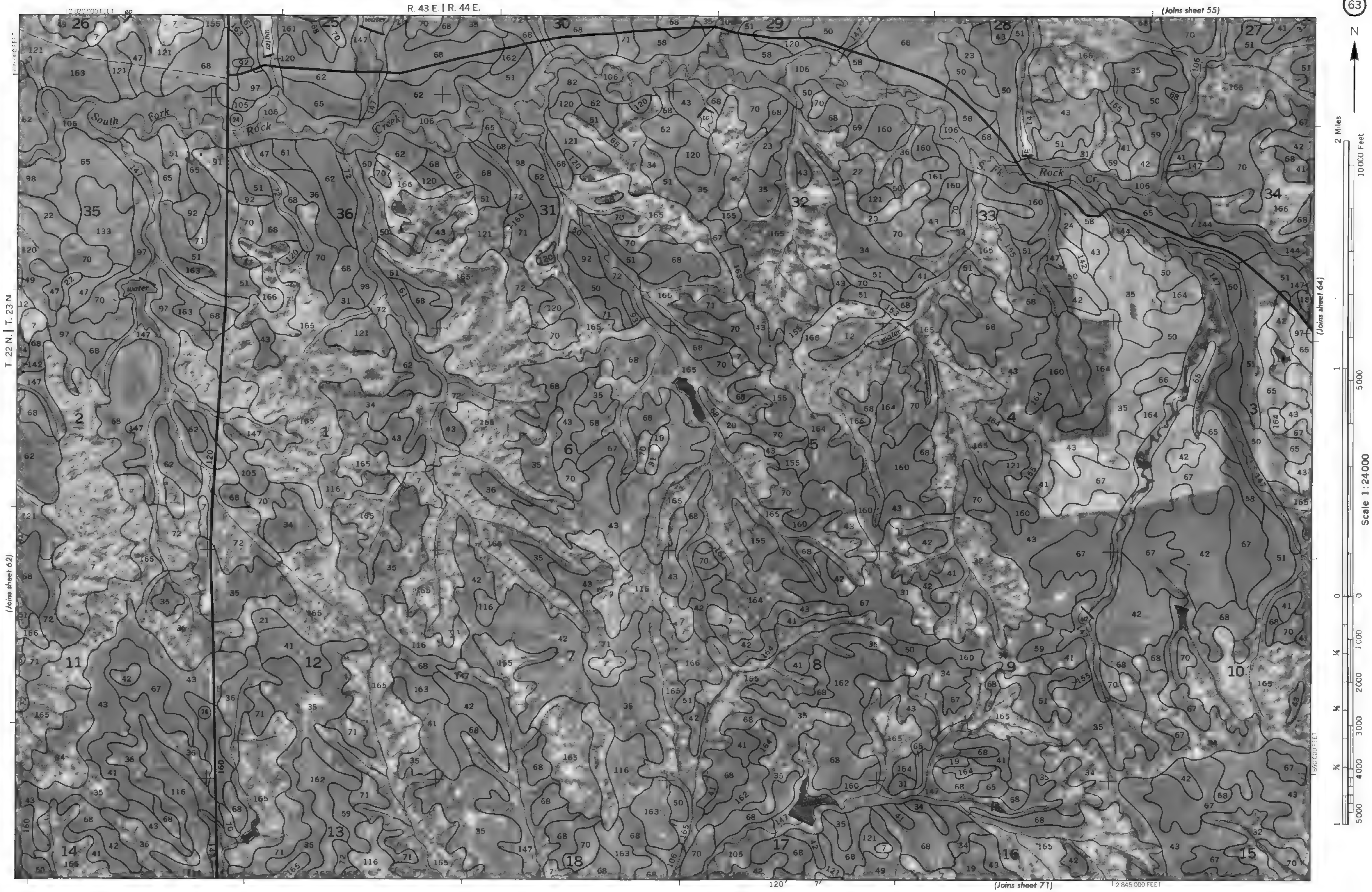
1000
2000
3000
4000
5000

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.





This map is compiled on 1978 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


63
R. 43 E. | R. 44 E.
T. 22 N. | T. 23 N.
(Joins sheet 55)
(Joins sheet 64)
(Joins sheet 62)
(Joins sheet 71)
2 820 000 FEET
2 845 000 FEET
South Fork Rock Creek
S. Fk. Rock Cr.
water
N
2 Miles
10000 Feet
Scale 1:24000

64

McCONE COUNTY, MONTANA — SHEET NUMBER 64

65

N

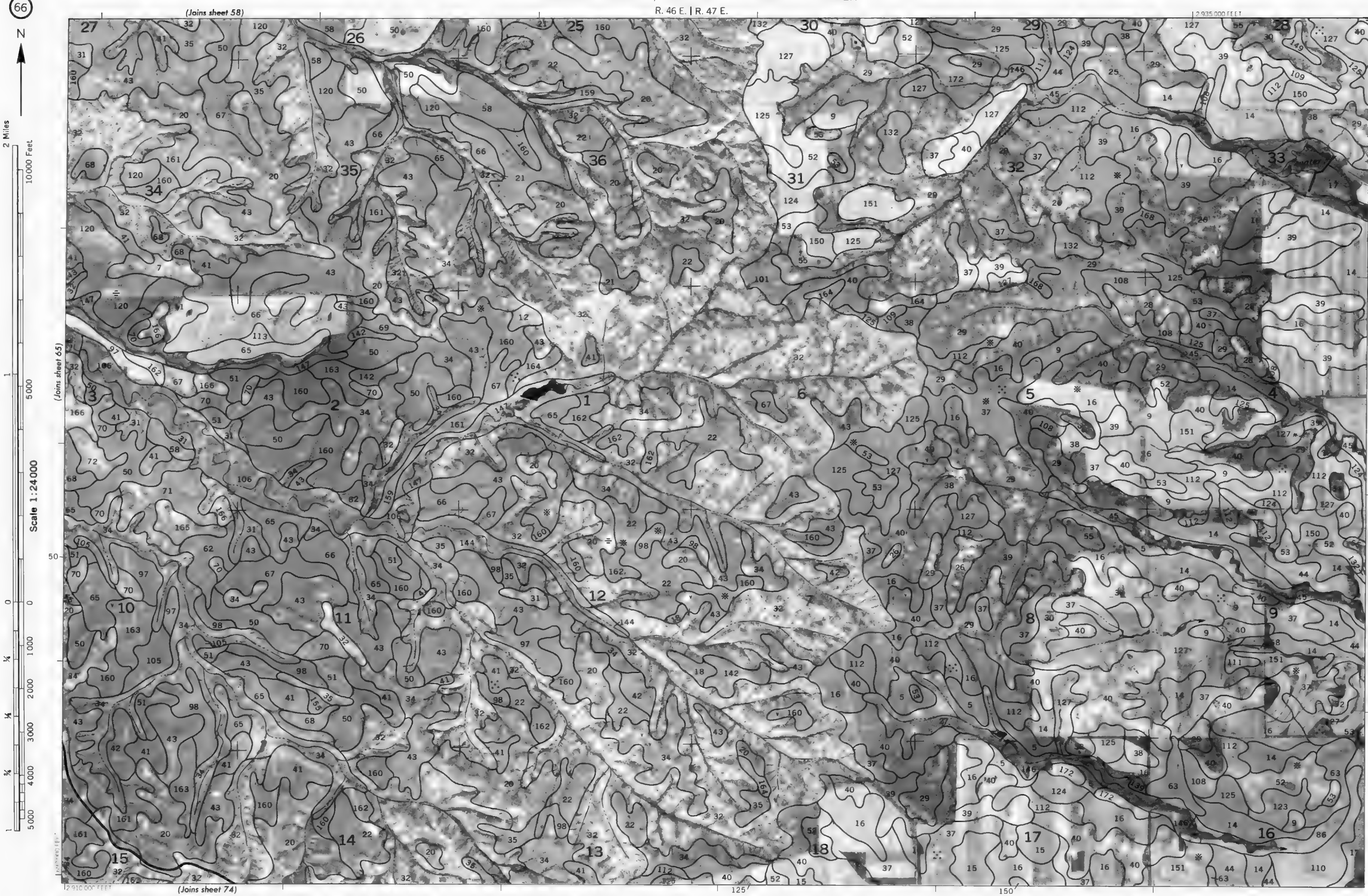
Scale 1:24000

2 Miles

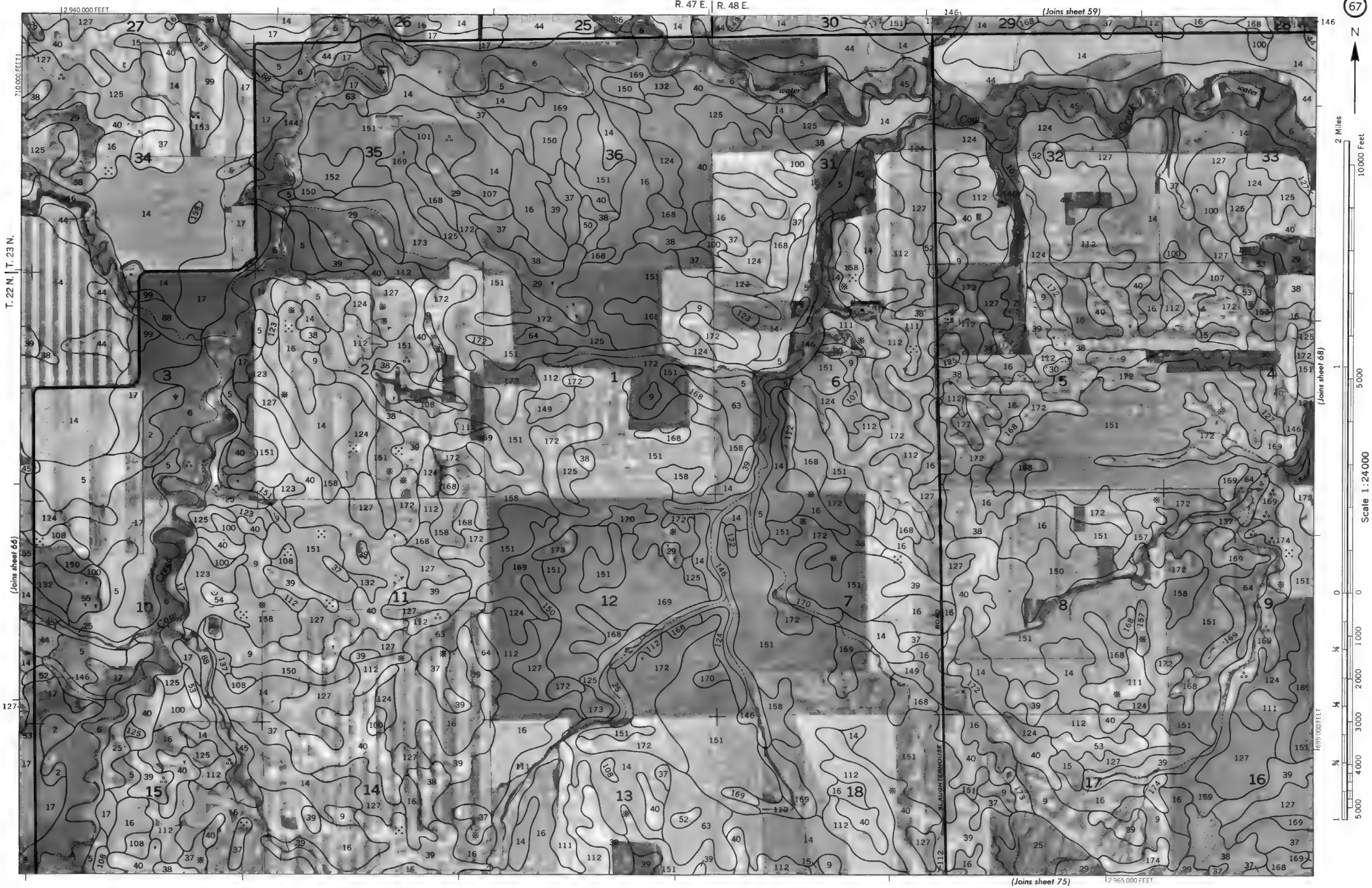
10 000 Feet

This map is compiled on 1979 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

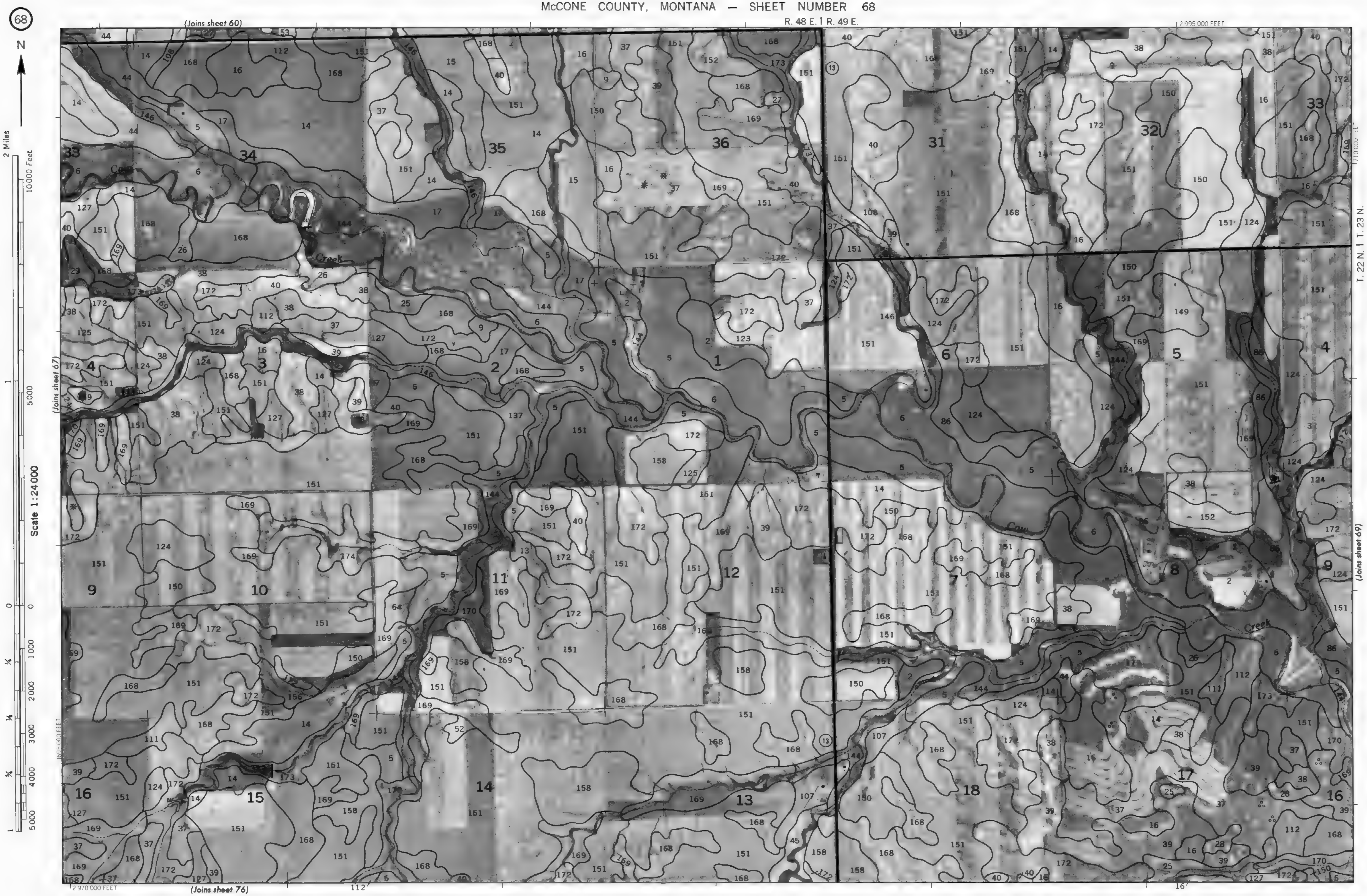
McCONE COUNTY, MONTANA — SHEET NUMBER 66

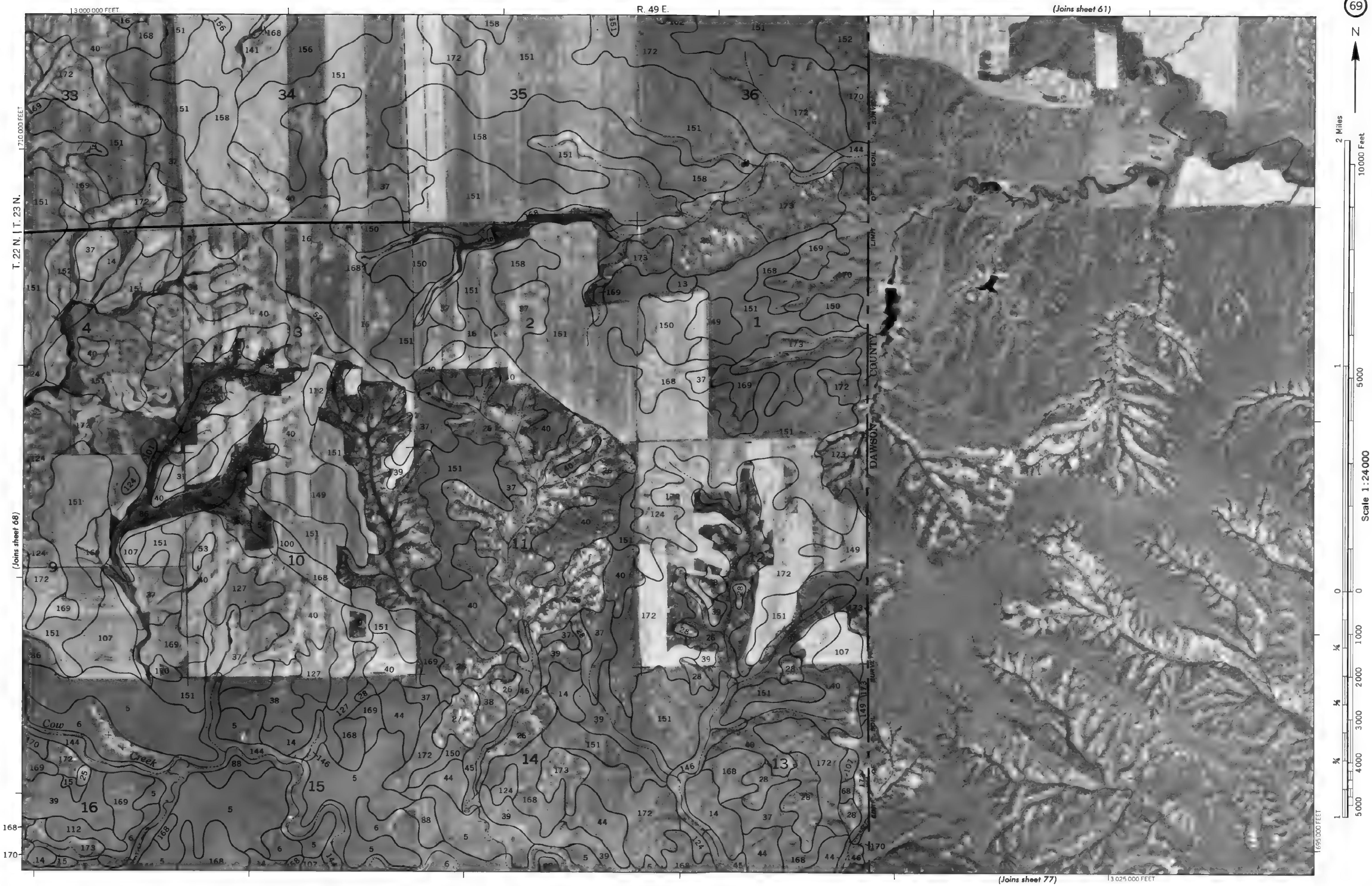


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

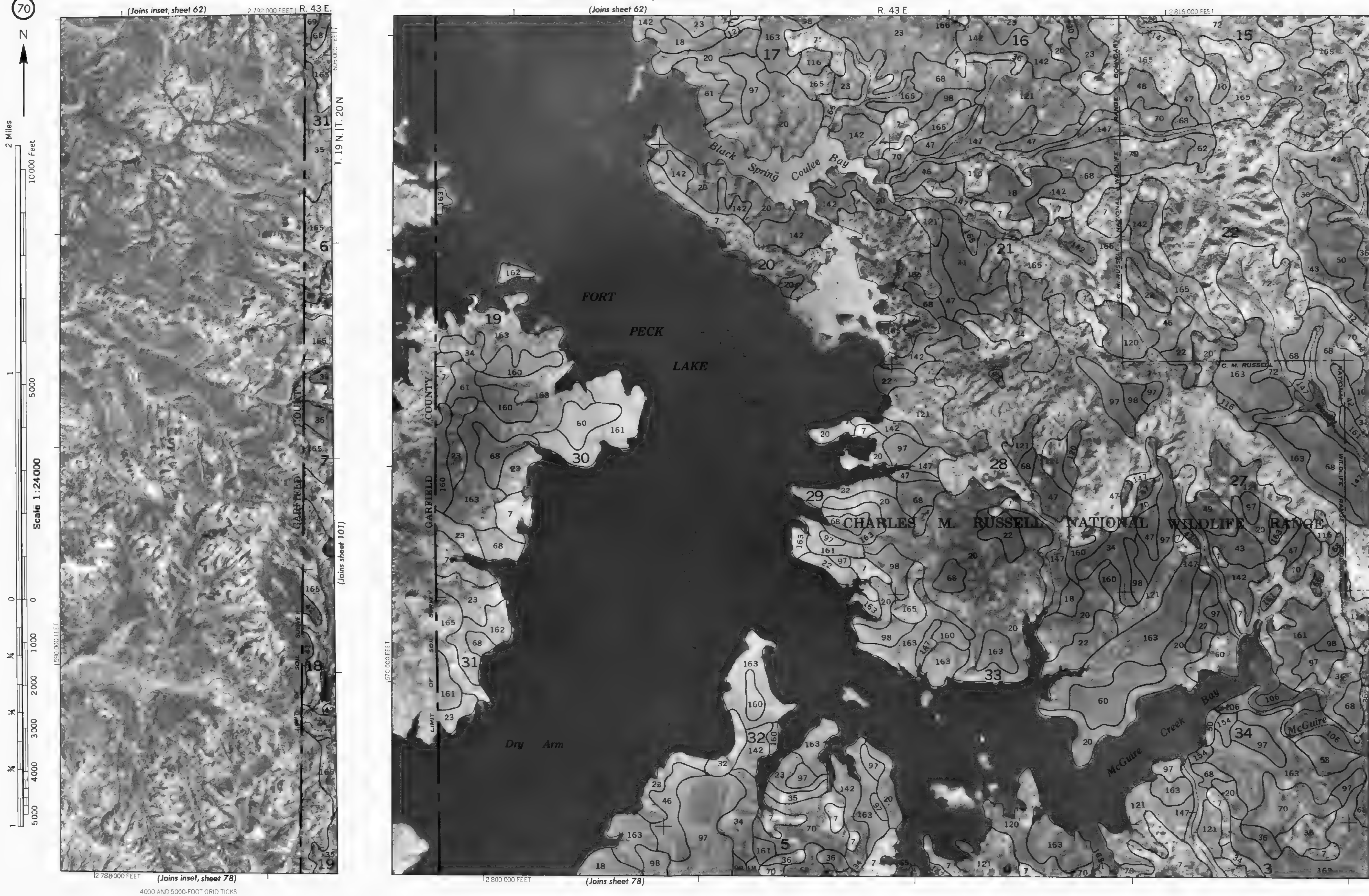


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

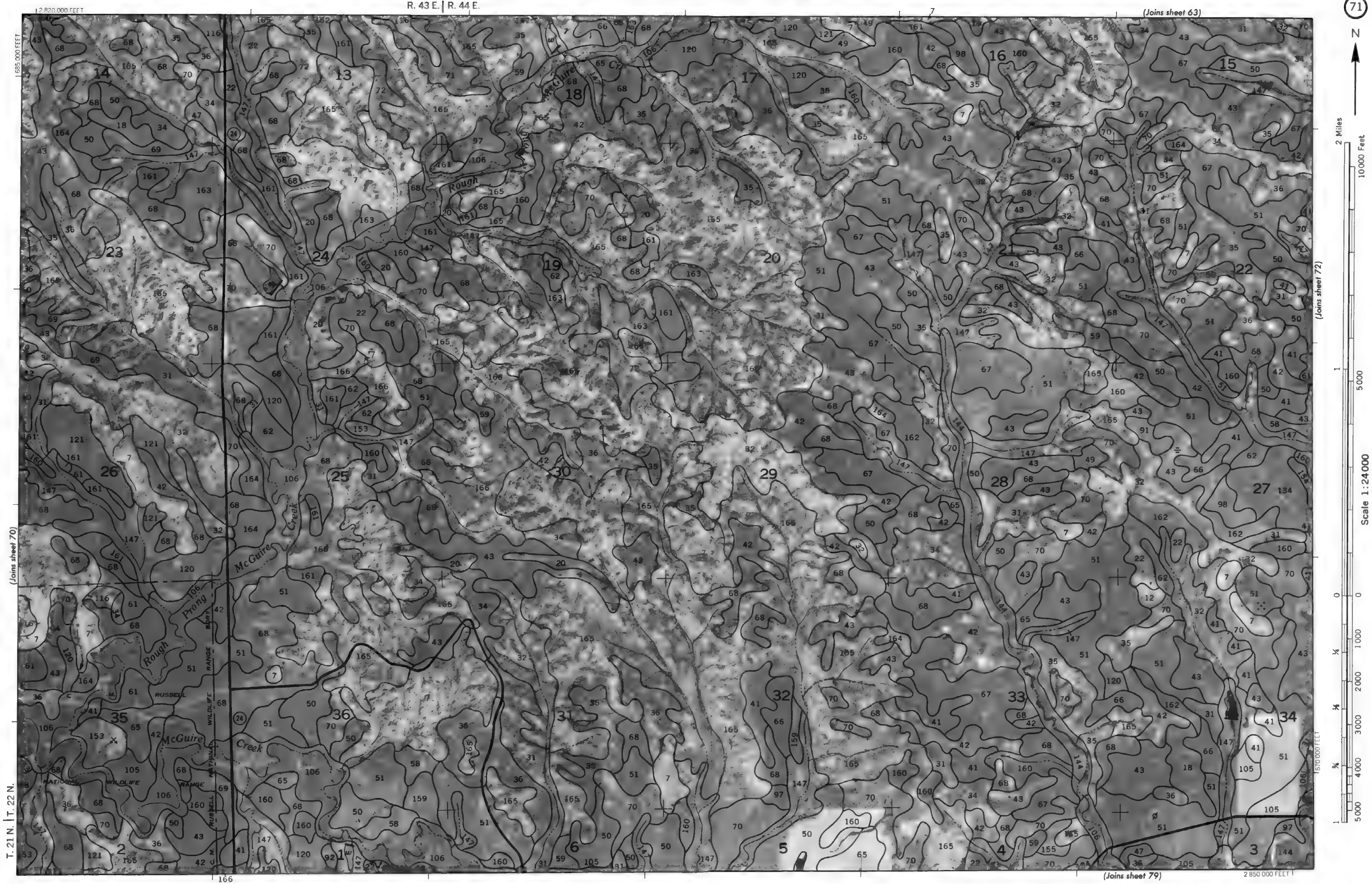

68
N
(Joins sheet 60)
R. 48 E. | R. 49 E.
(Joins sheet 67)
(Joins sheet 69)
(Joins sheet 76)
T. 23 N.
T. 22 N.
Scale 1:24 000
2 Miles
10 000 Feet
Cow Creek
2 995 000 FEET
2 970 000 FEET



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

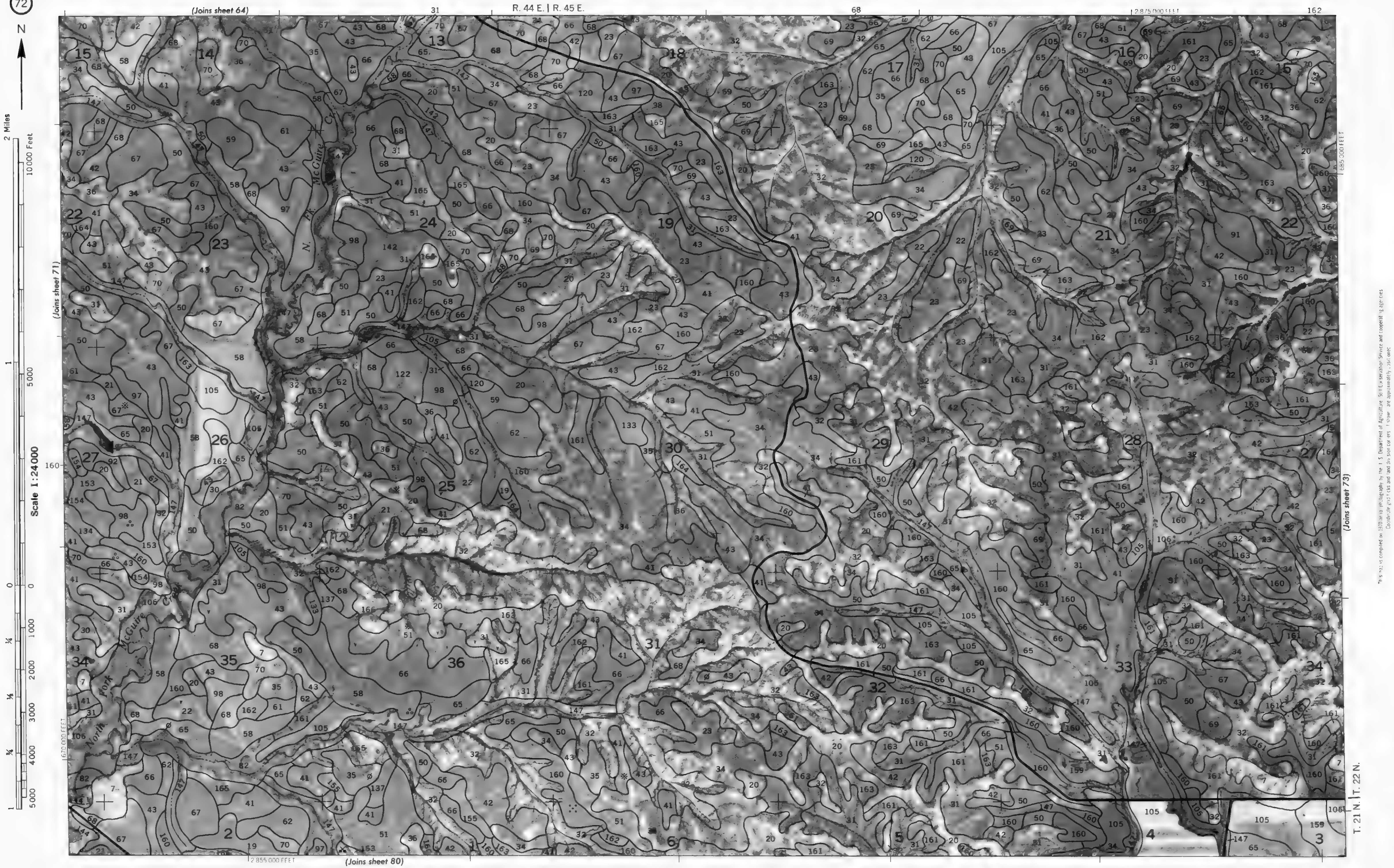


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

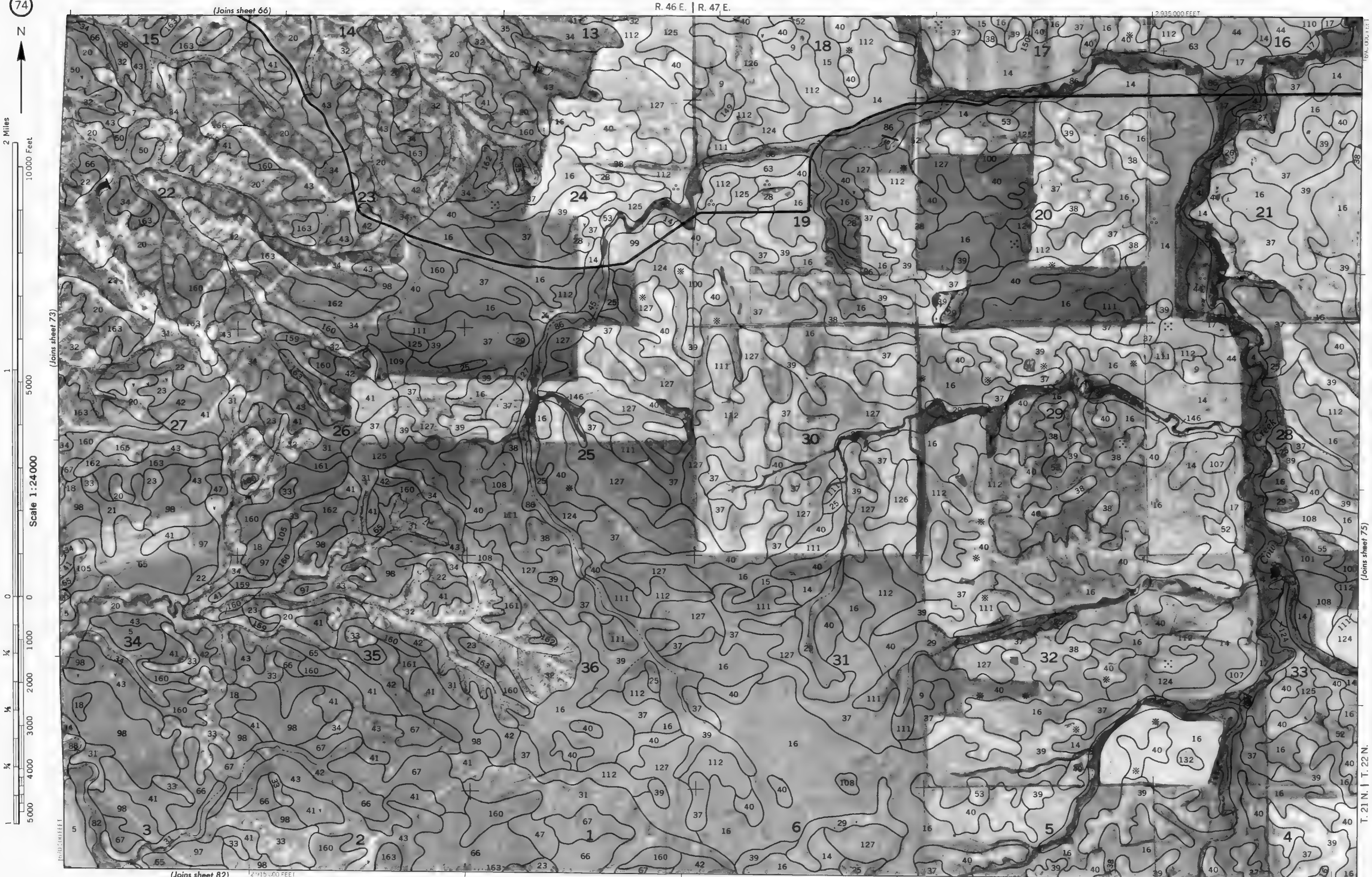
McCONE COUNTY, MONTANA — SHEET NUMBER 72



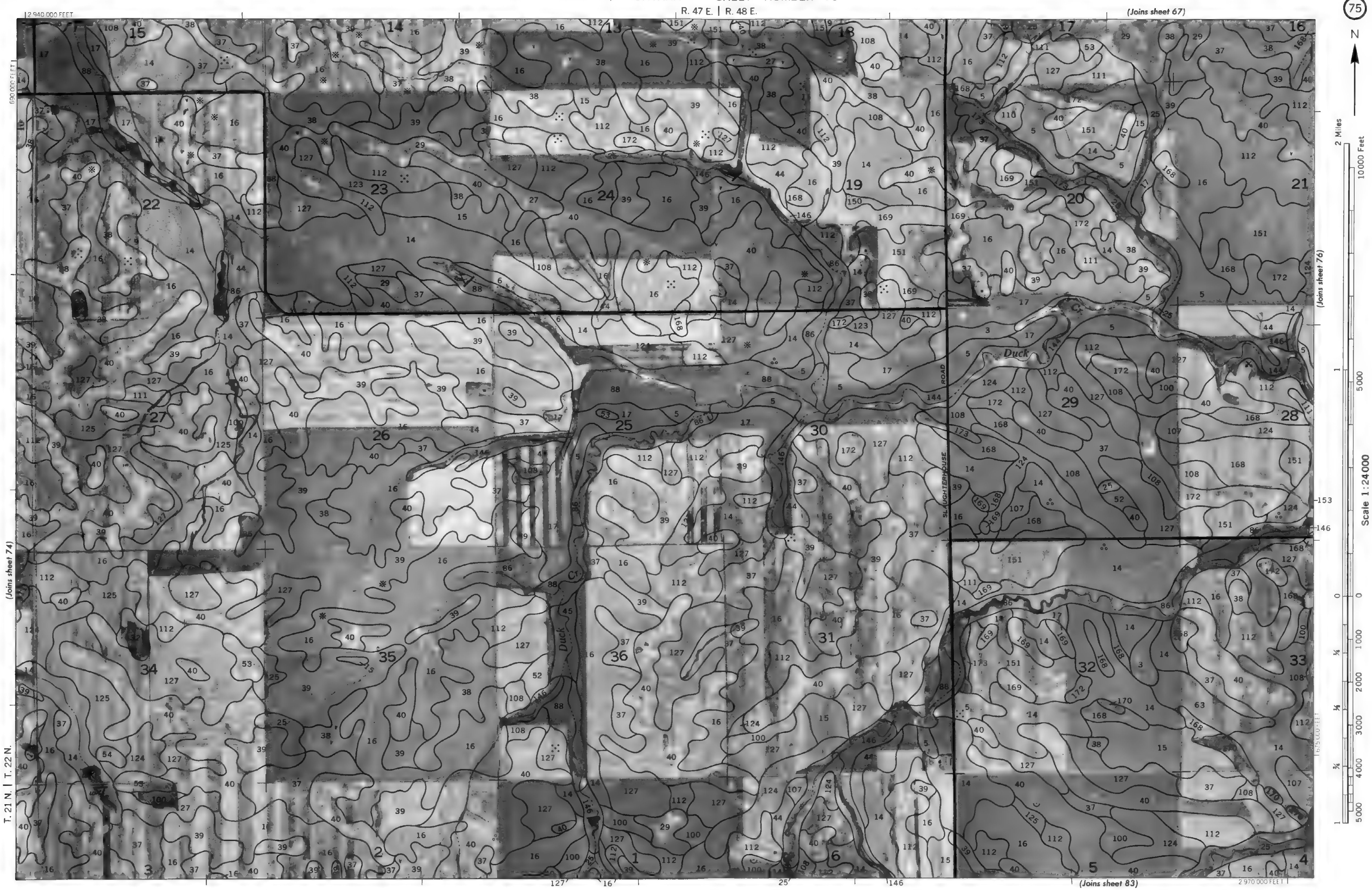
73

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

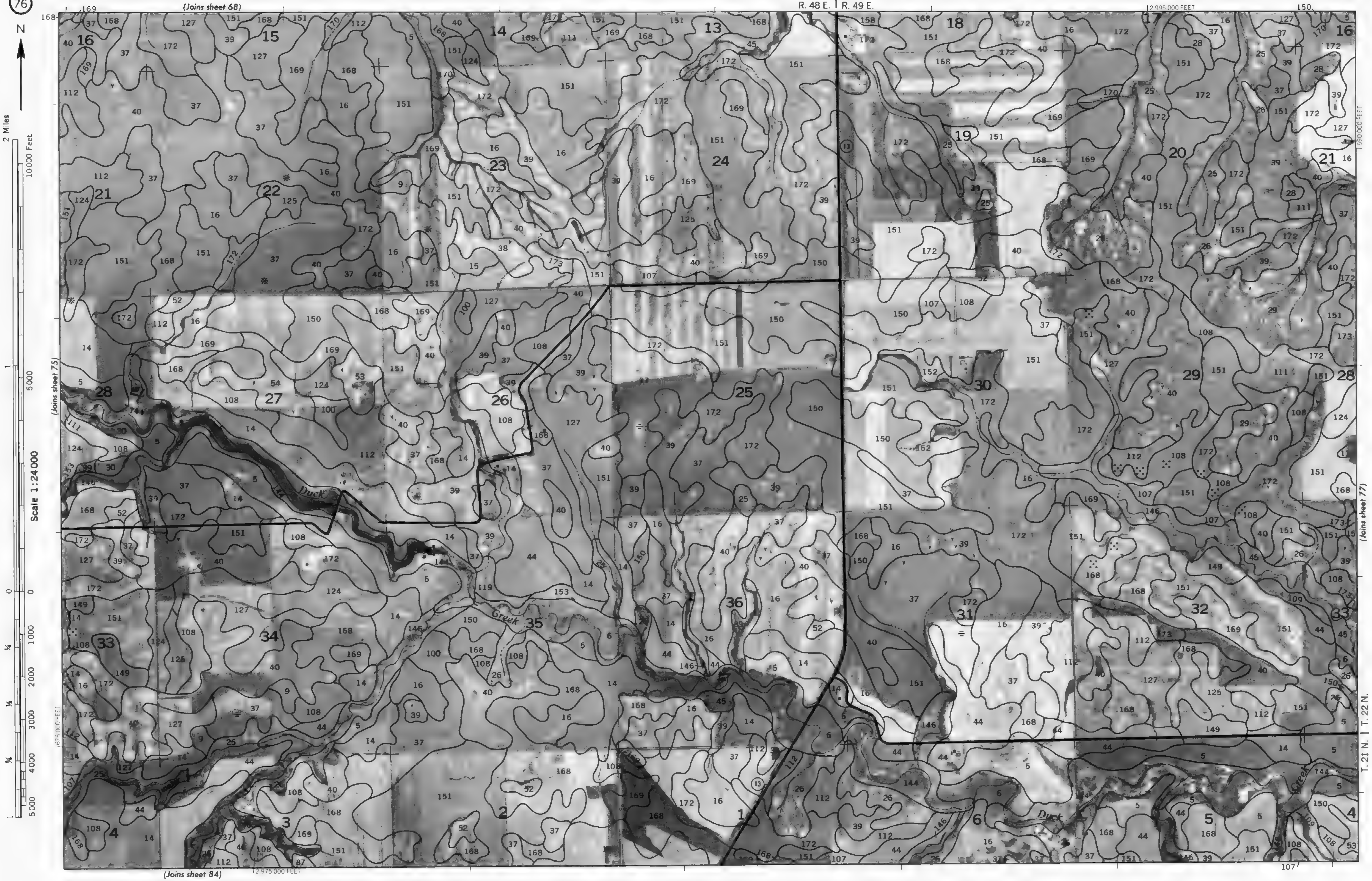
McCONE COUNTY, MONTANA — SHEET NUMBER 74



This map is compiled on 197[illegible] aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

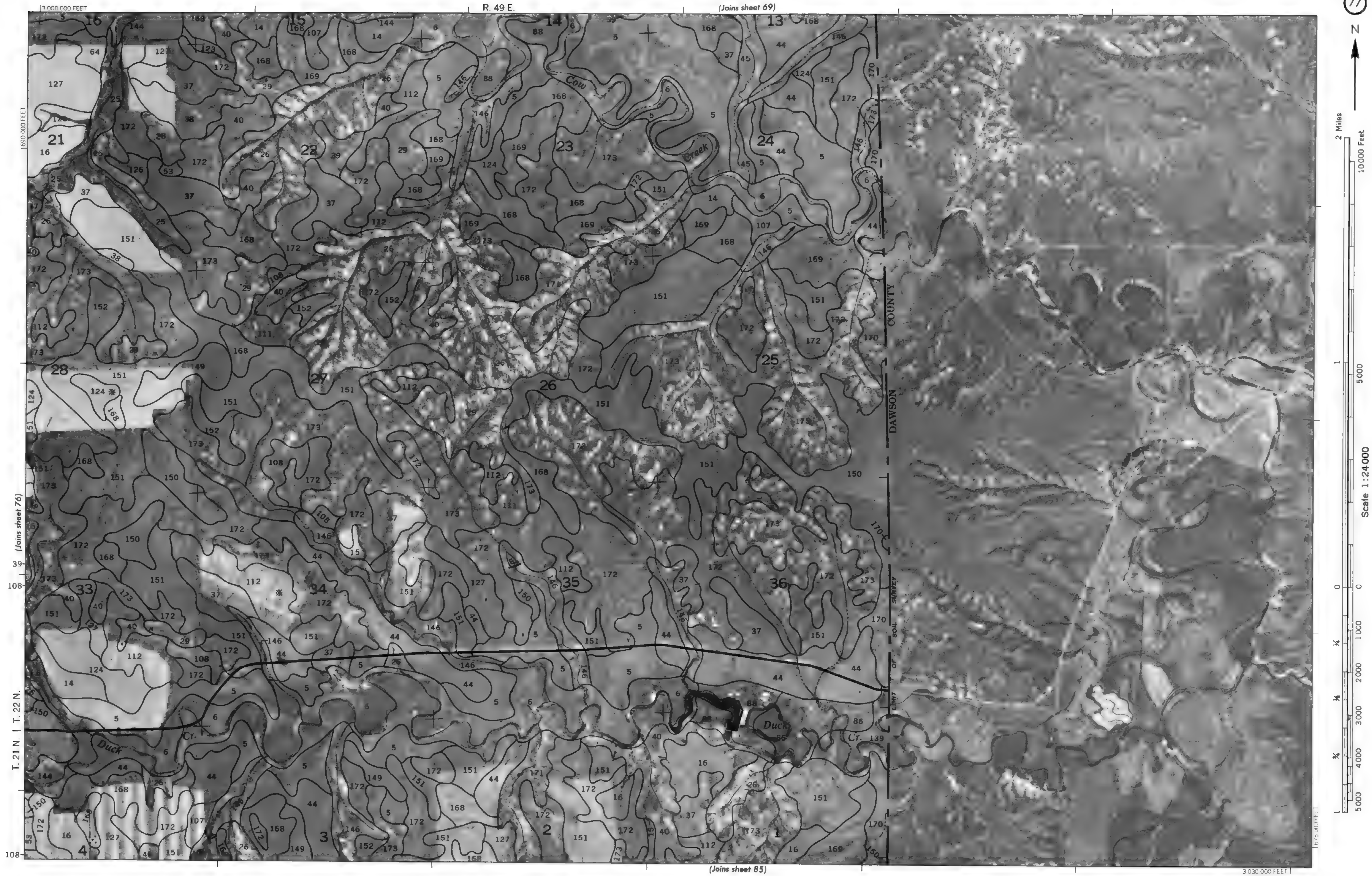

75
R. 47 E. | R. 48 E.
(Joins sheet 67)
(Joins sheet 76)
(Joins sheet 74)
(Joins sheet 83)
T. 21 N. | T. 22 N.
2 940 000 FEET
2 970 000 FEET
690 000 FEET
Duck Cr.
SLAUGHTERHOUSE ROAD
N
Scale 1:24 000
2 Miles
10000 Feet

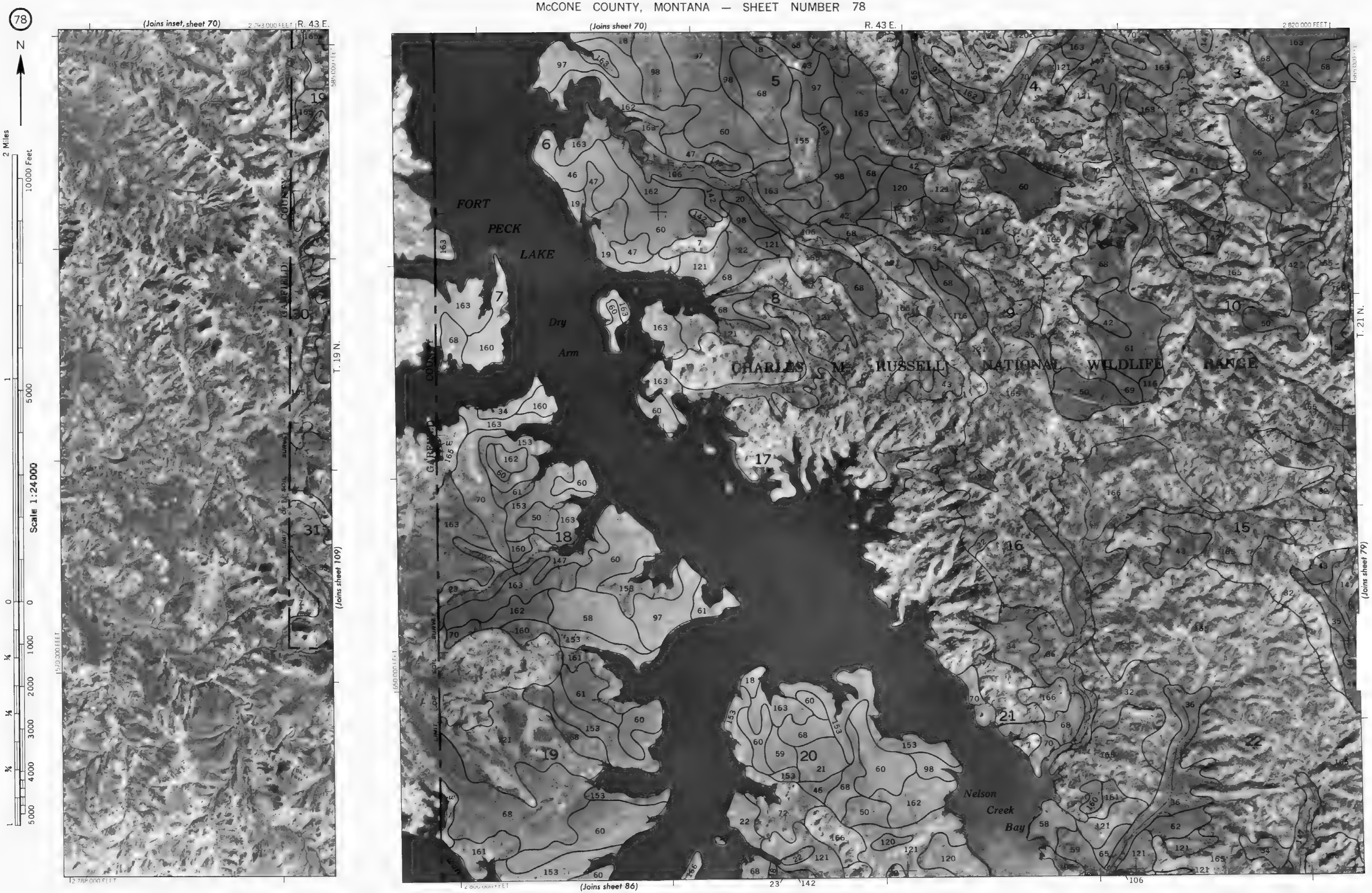
76



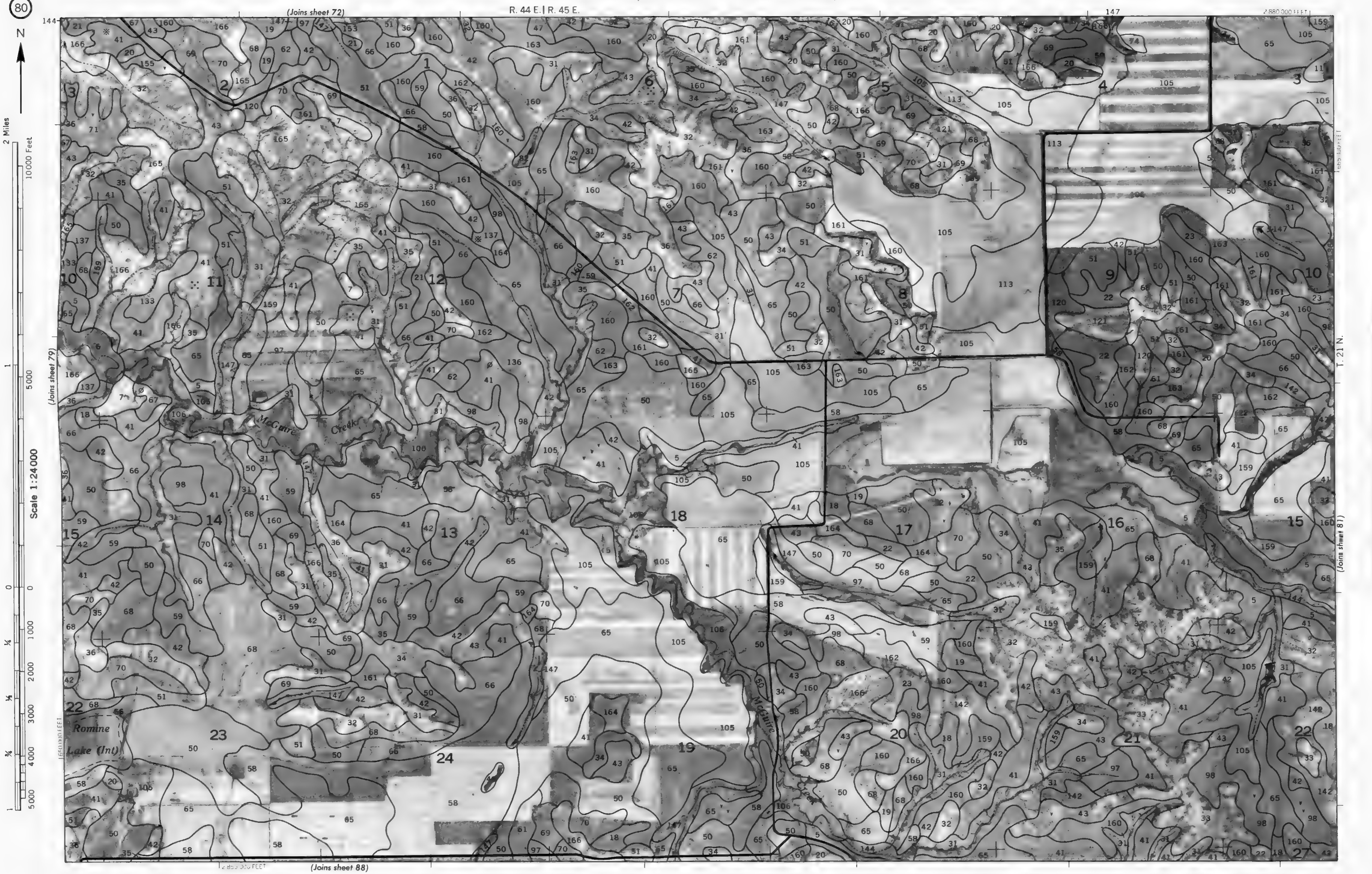
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 77

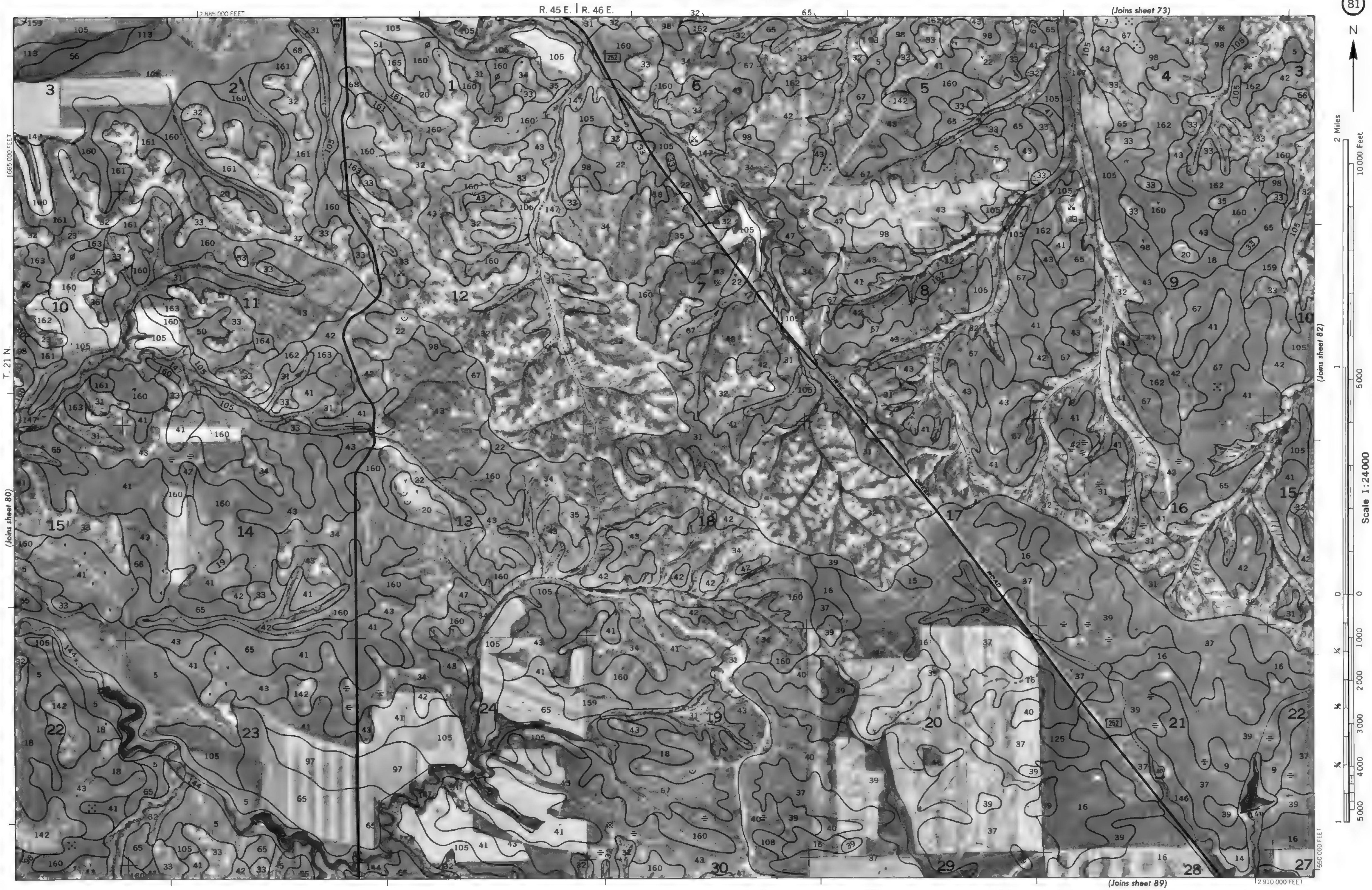



78
N
2 Miles
10000 Feet
5000
Scale 1:24 000
(Joins inset, sheet 70)
R. 43 E.
GARFIELD COUNTY
T. 19 N.
(Joins sheet 109)
LIMIT OF SOIL SURVEY
(Joins sheet 70)
R. 43 E.
T. 21 N.
FORT PECK LAKE
Dry Arm
CHARLES M RUSSELL NATIONAL WILDLIFE RANGE
Nelson Creek Bay
(Joins sheet 79)
(Joins sheet 86)

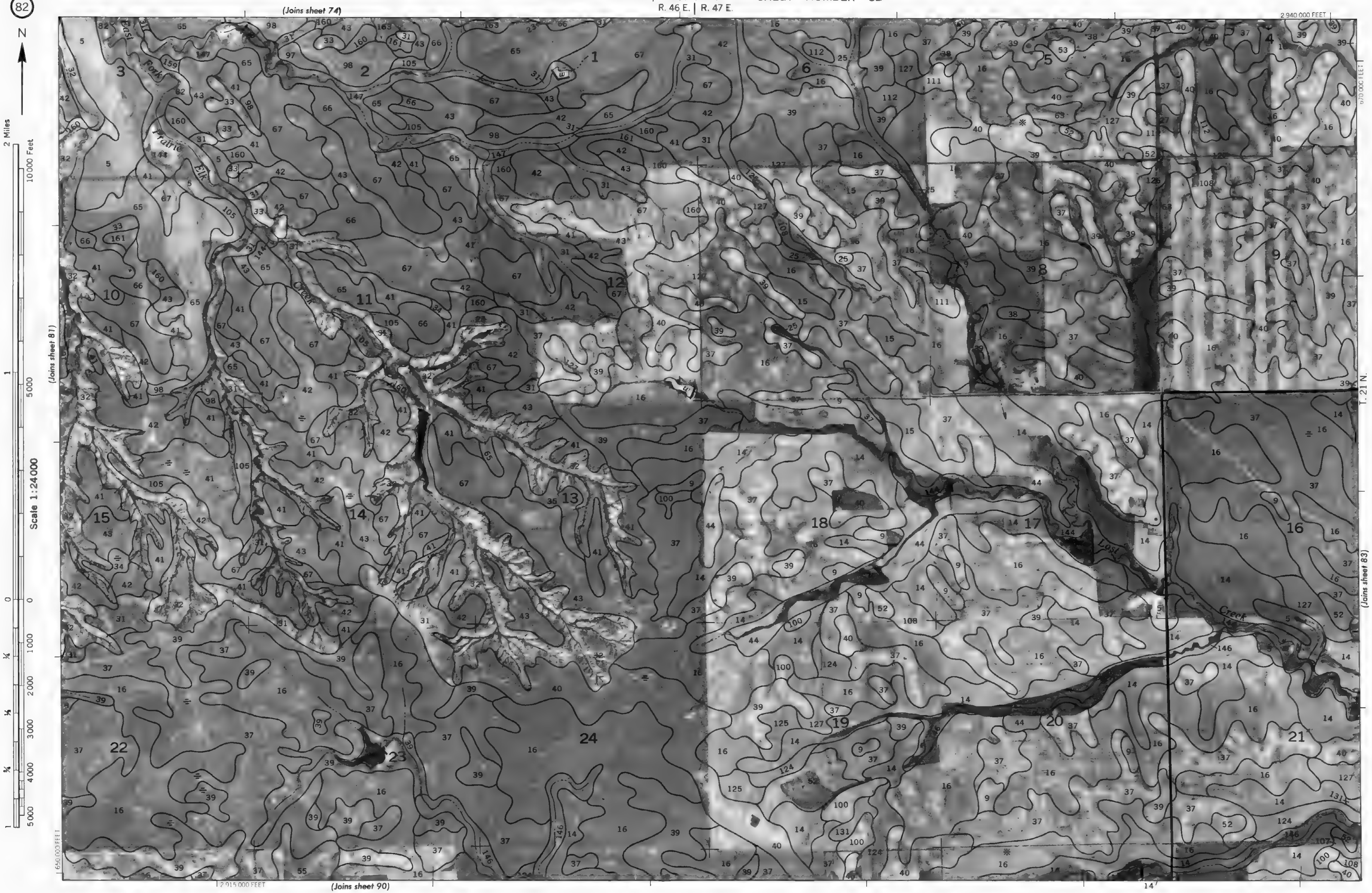

R. 43 E.
R. 44 E.
2 825 000 FEET
(Joins sheet 71)
(Joins sheet 78)
(Joins sheet 80)
(Joins sheet 87)
T. 21 N.
CHARLES M. RUSSELL
NATIONAL WILDLIFE
RANGE
McGuire
Creek
McGuire Cr
Romine
Lake
(intermittent)
2 850 000 FEET
1 650 000 FEET
N
Scale 1:24 000
2 Miles
10 000 Feet
5000
1000
2000
3000
4000


80
N
(Joins sheet 72)
R. 44 E. | R. 45 E.
(Joins sheet 79)
(Joins sheet 81)
(Joins sheet 88)
T. 21 N.
McGuire Creek
McGuire
Romine Lake (Int)
Scale 1:24000
2 Miles
10000 Feet
5000
0
1000
2000
3000
4000
5000

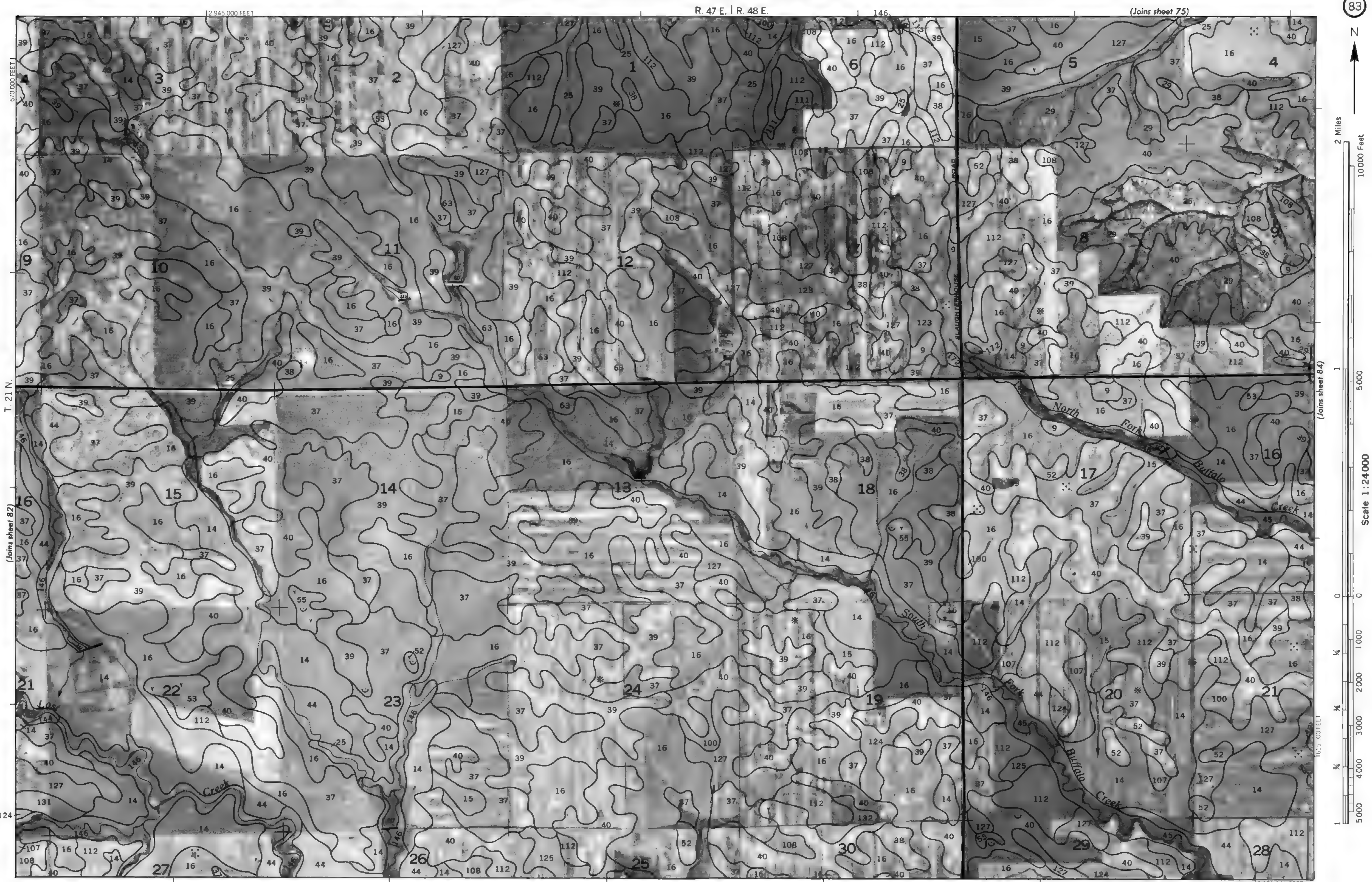
McCONE COUNTY, MONTANA — SHEET NUMBER 81



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

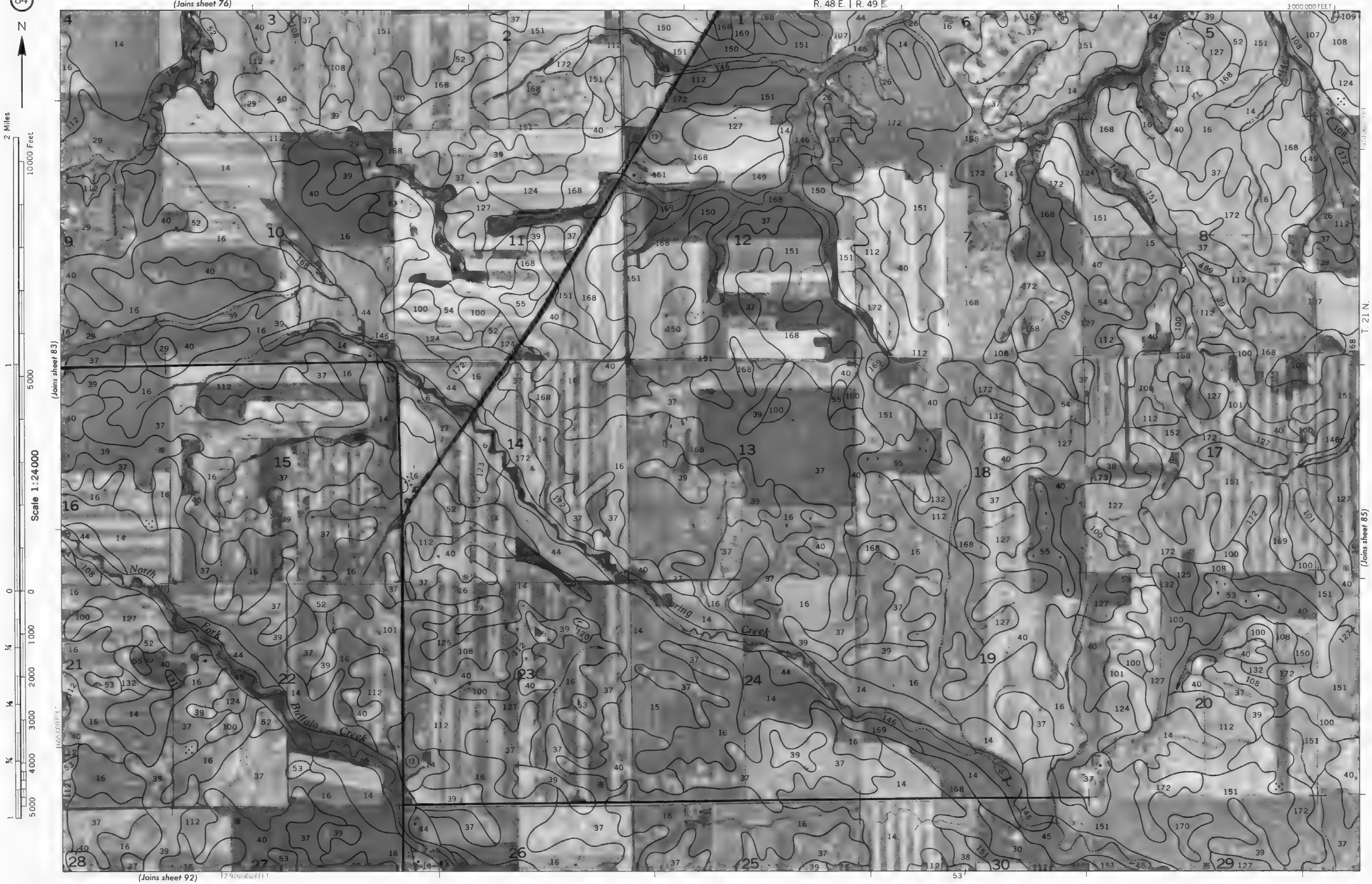


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

84



N
2 Miles
10000 Feet
5000
Scale 1:24 000
(Joins sheet 76)
(Joins sheet 83)
(Joins sheet 85)
(Joins sheet 92)
R. 48 E. | R. 49 E.
T. 21 N.
3 000 000 FEET
North Fork
Buffalo Creek
Spring Creek

85

R. 49 E.

(Joins sheet 77)

T. 21 N.

(Joins sheet 84)

(Joins sheet 93)

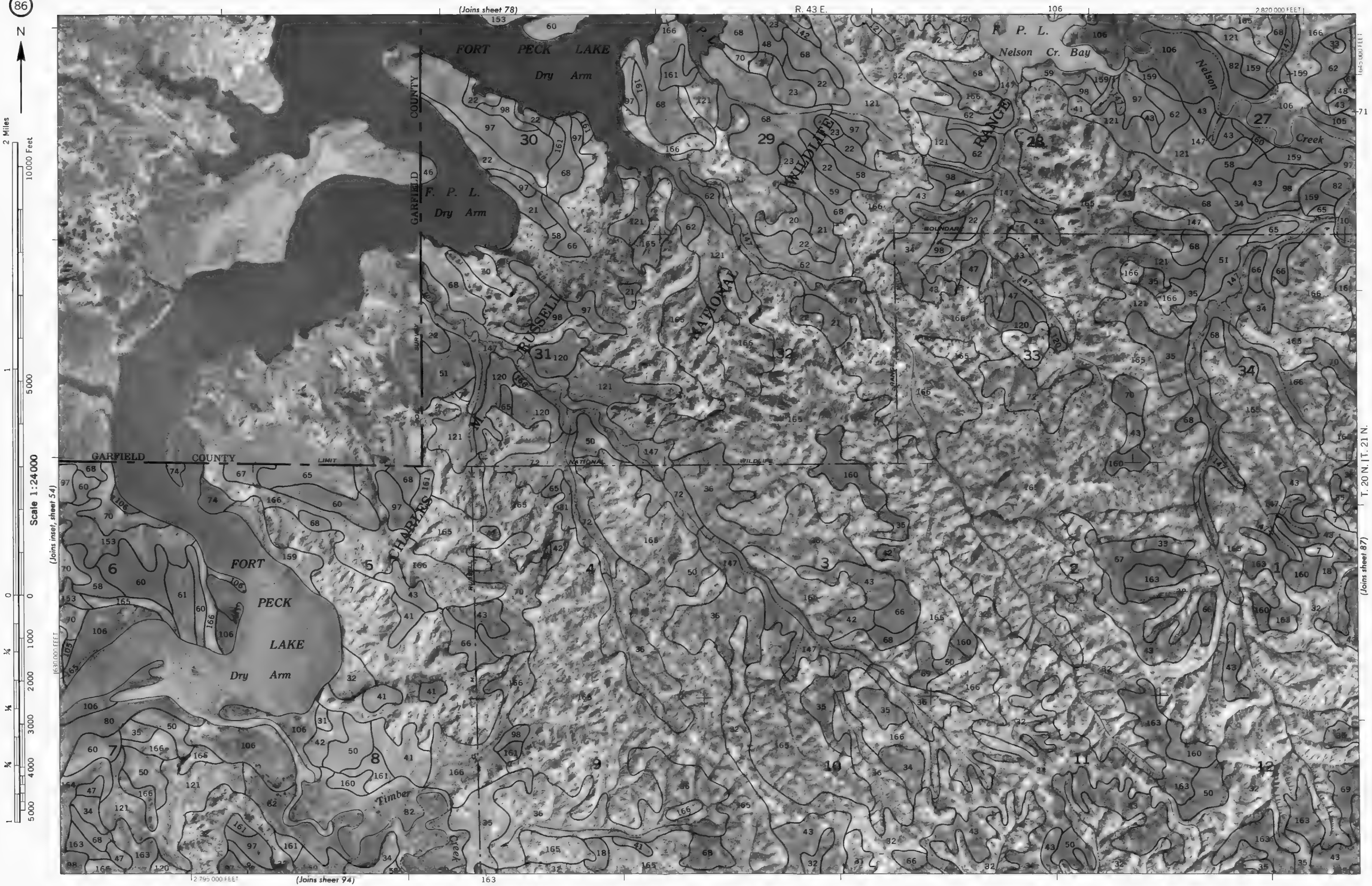
N

Scale 1:24000

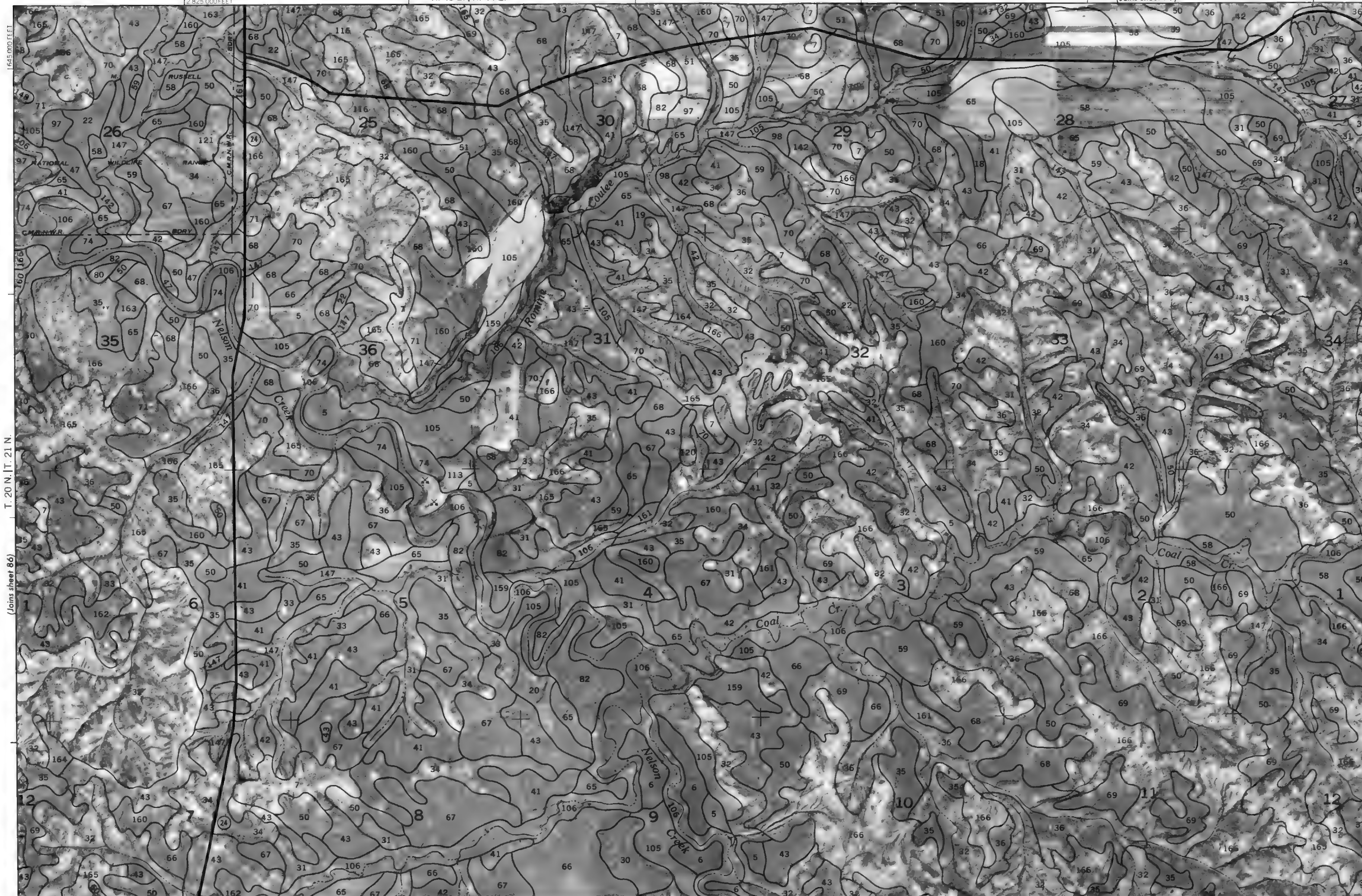
2 Miles
1
0
¼
½
¾
1

10000 Feet
5000
0
1000
2000
3000
4000
5000

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

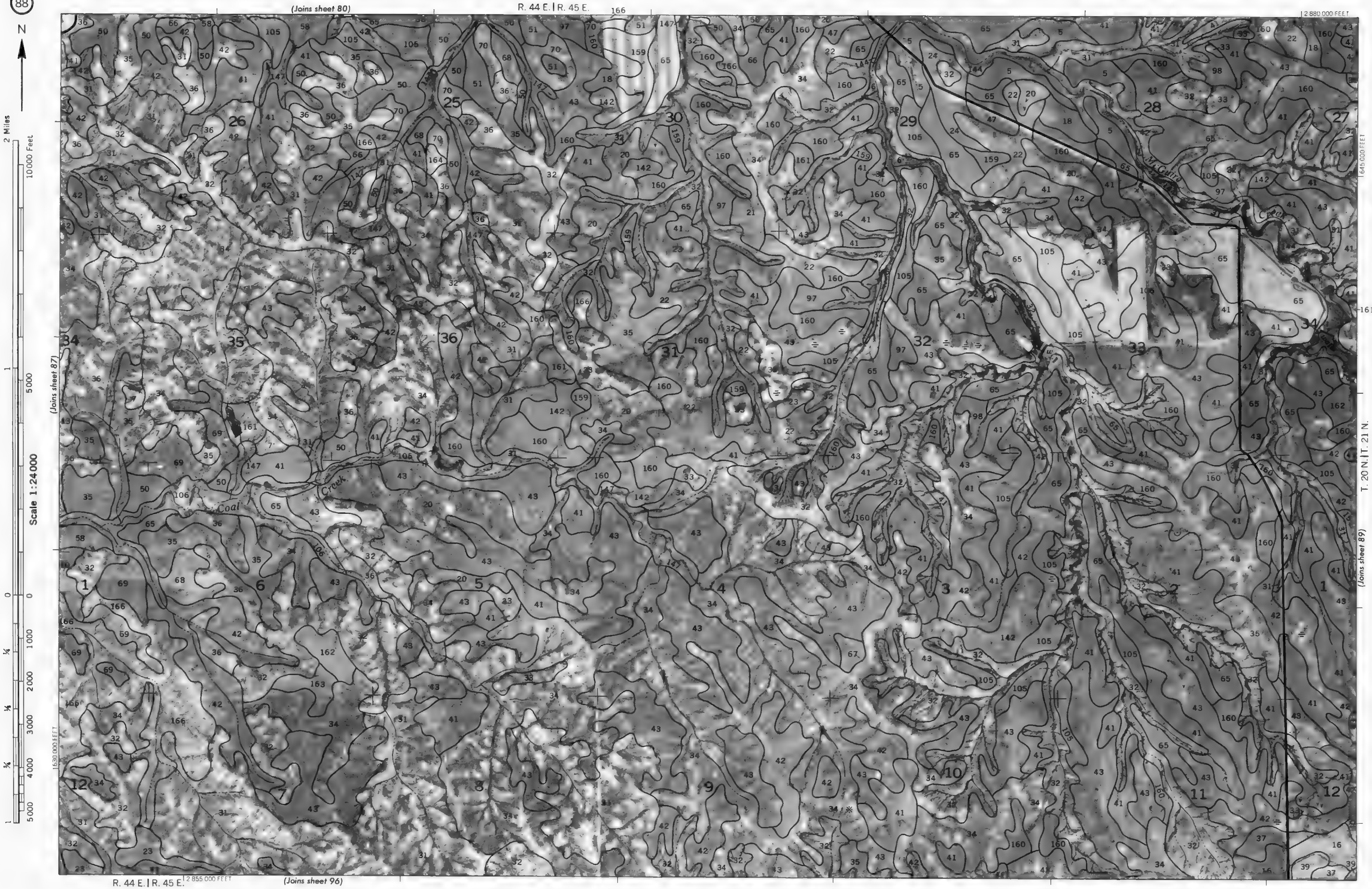

N
2 Miles
10000 Feet
5000
Scale 1:24000
(Joins sheet 78)
R. 43 E.
2 820 000 FEET
(Joins inset, sheet 54)
(Joins sheet 87)
(Joins sheet 94)
2 795 000 FEET
T. 20 N. | T. 21 N.
FORT PECK LAKE
Dry Arm
F. P. L.
Dry Arm
F. P. L.
Nelson Cr. Bay
Nelson
Creek
GARFIELD COUNTY
GARFIELD COUNTY
CHARLES M. RUSSELL NATIONAL WILDLIFE RANGE
BOUNDARY
LIMIT
FORT PECK LAKE
Dry Arm
Timber
Creek

87

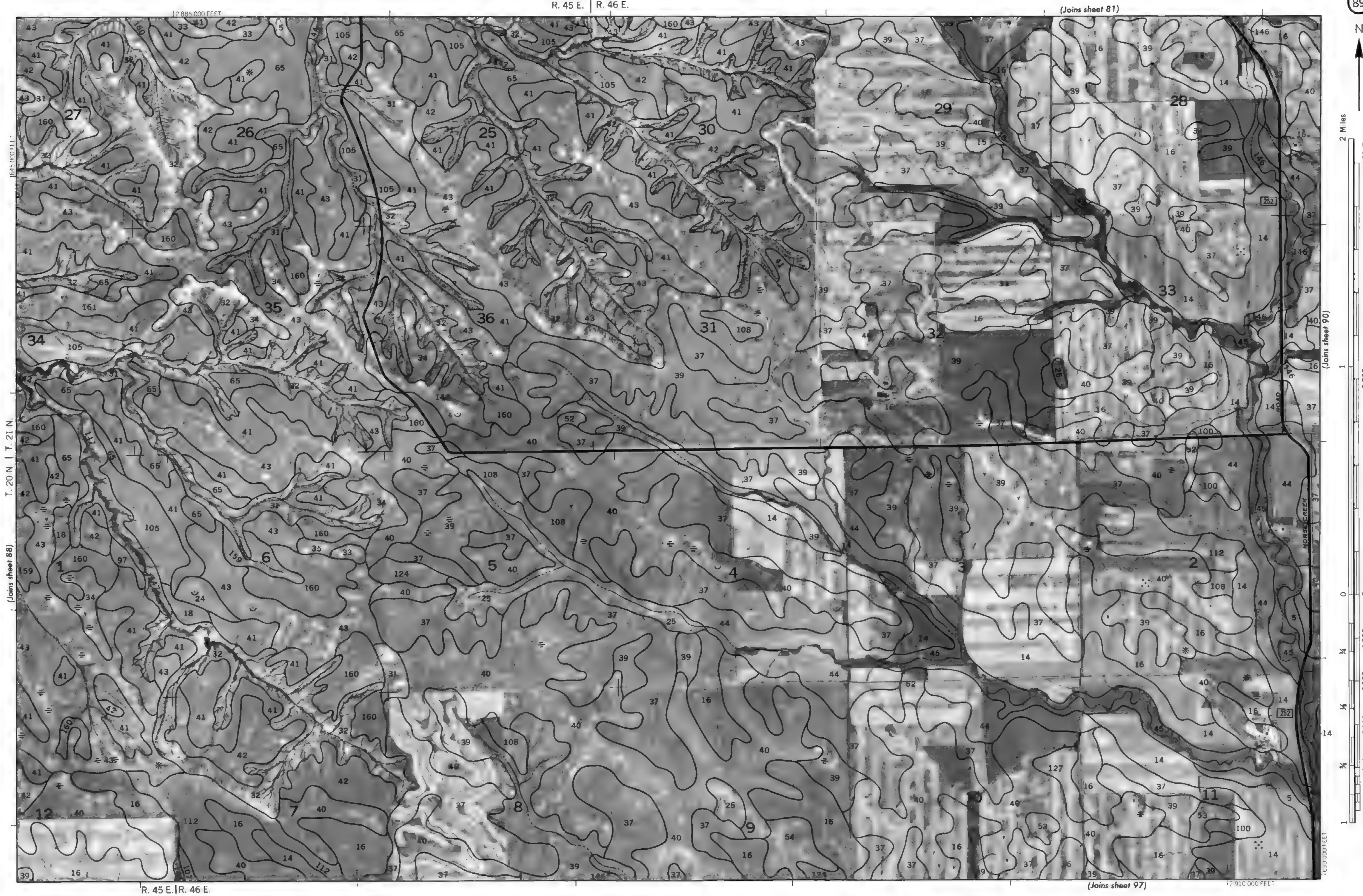


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 88

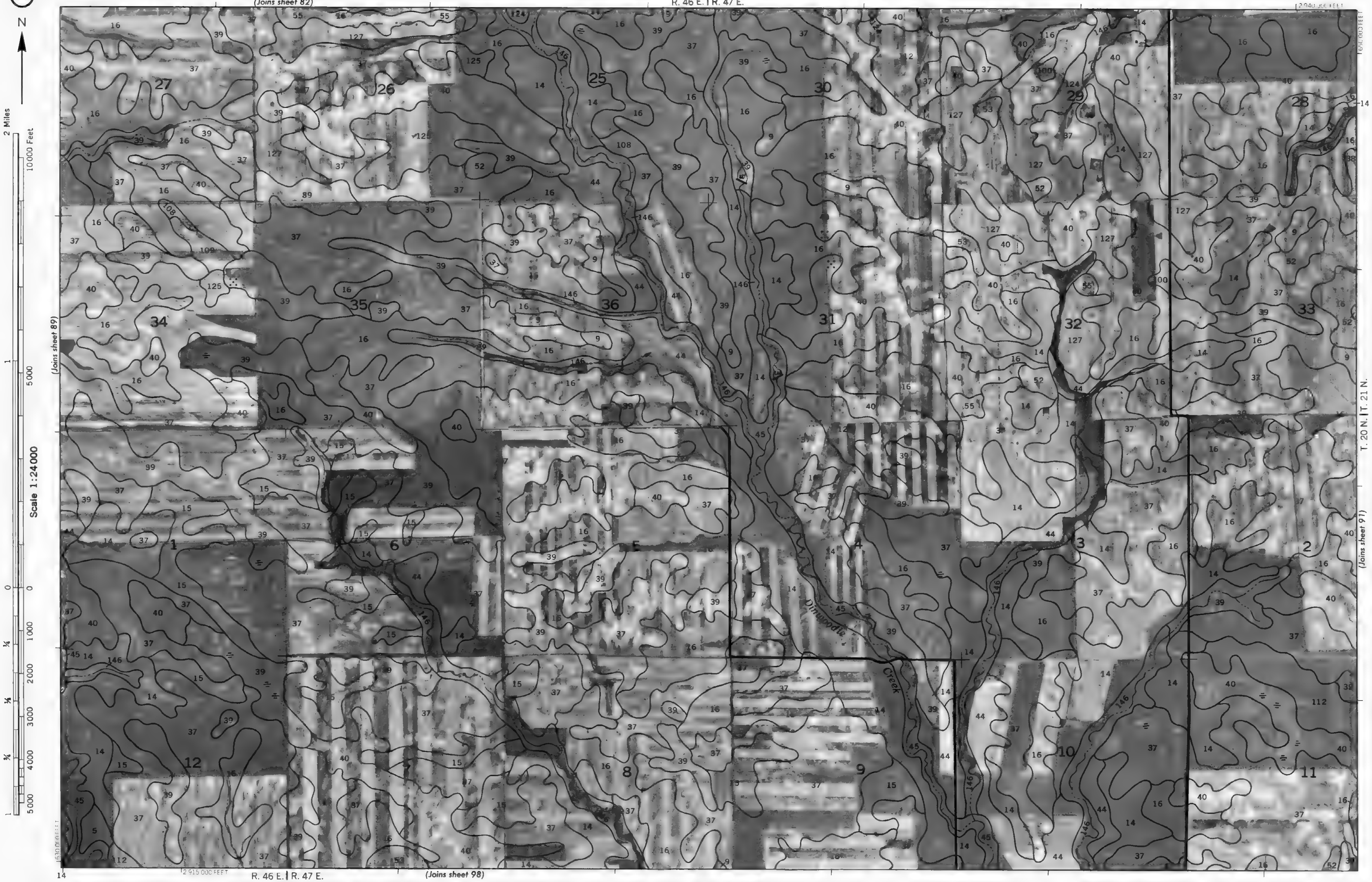


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

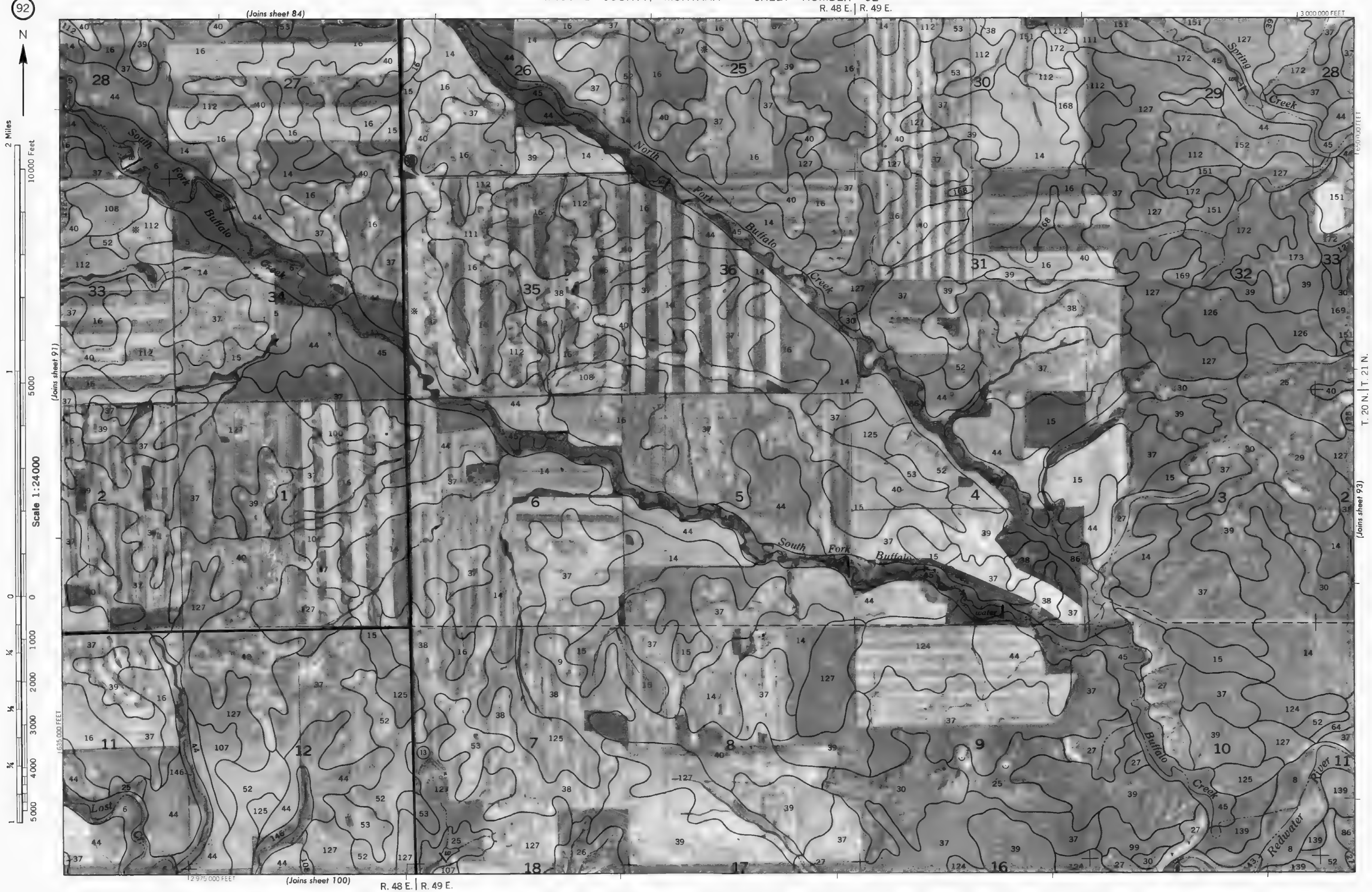
McCONE COUNTY, MONTANA — SHEET NUMBER 90



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land divisions on corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 92



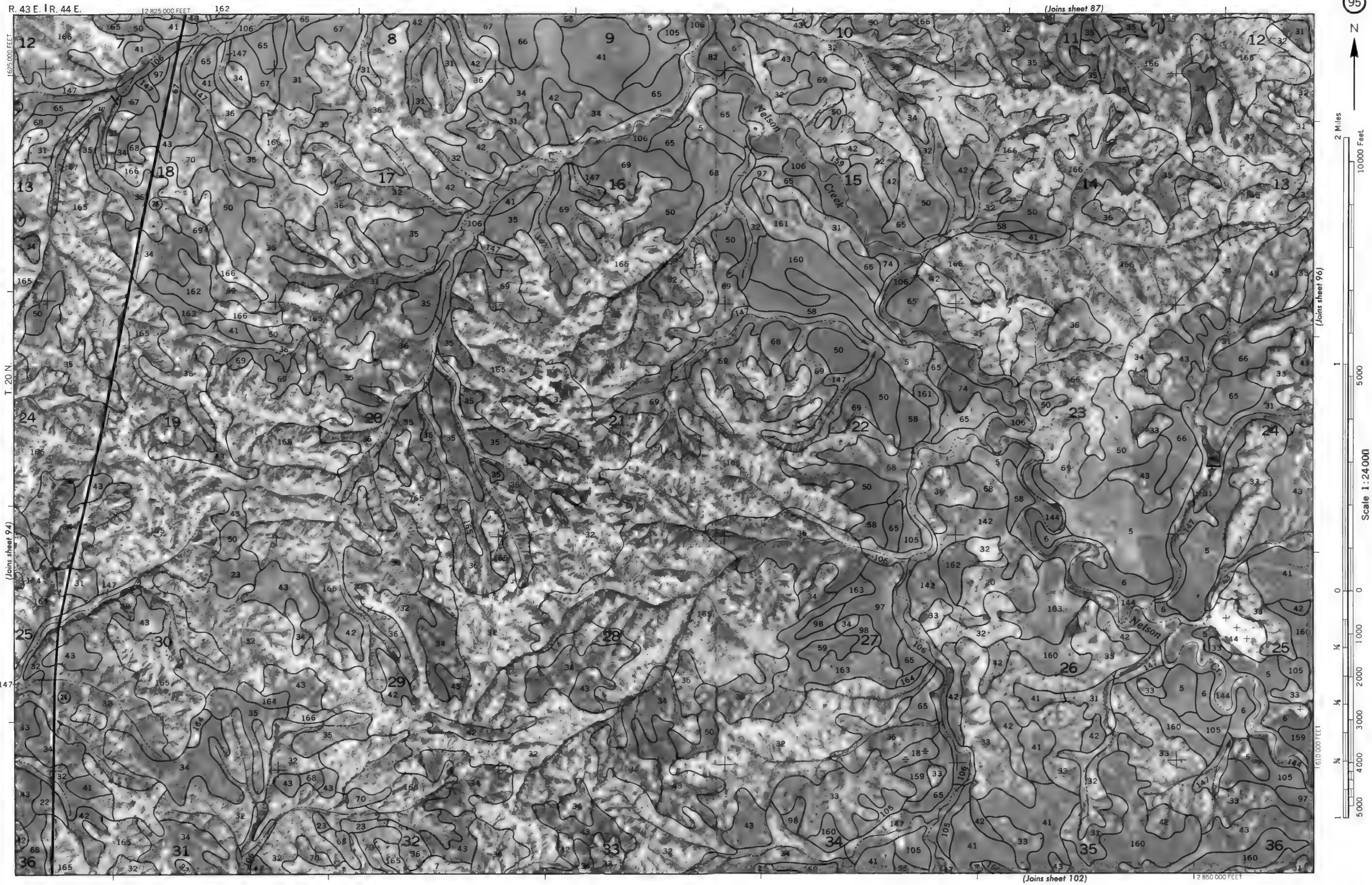
This map is compiled on 197[illegible] aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

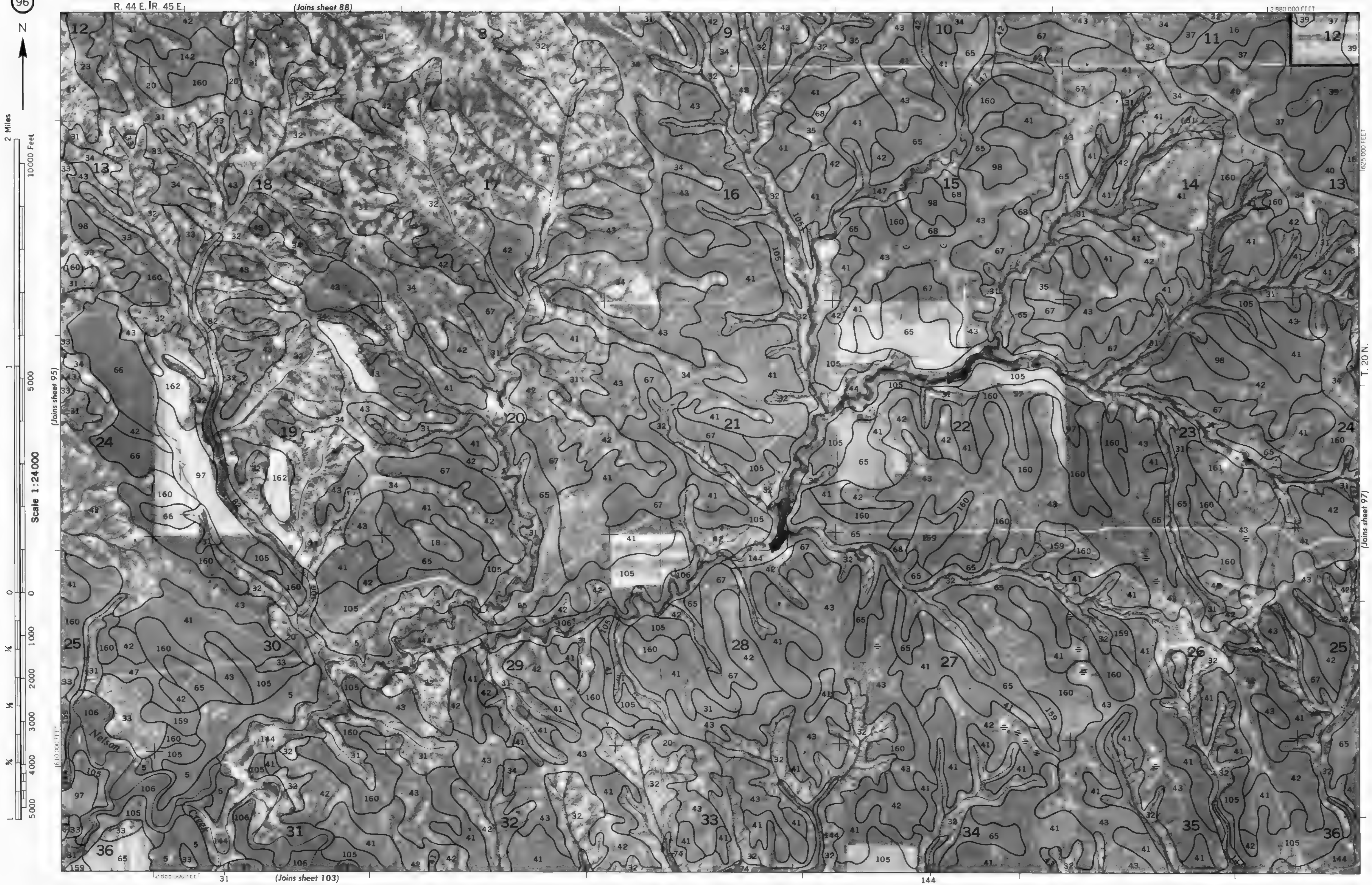
94

McCONE COUNTY, MONTANA — SHEET NUMBER 94

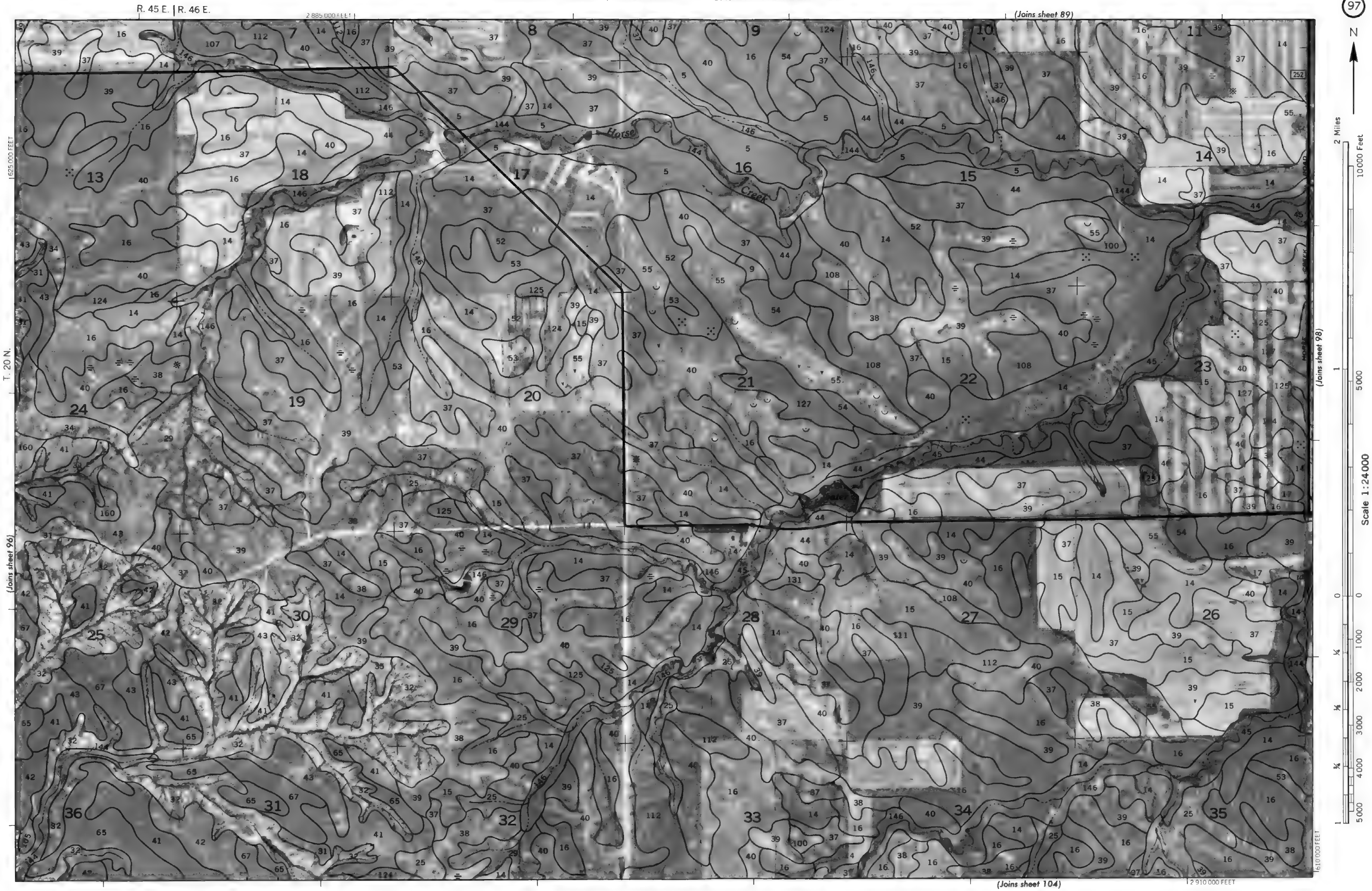
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1978 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

R. 46 E. | R. 47 E.

(Joins sheet 90)

(Joins sheet 97)

(Joins sheet 99)

(Joins sheet 105)

2 940 000 FEET

630 000 FEET

610 000 FEET

2 915 000 FEET

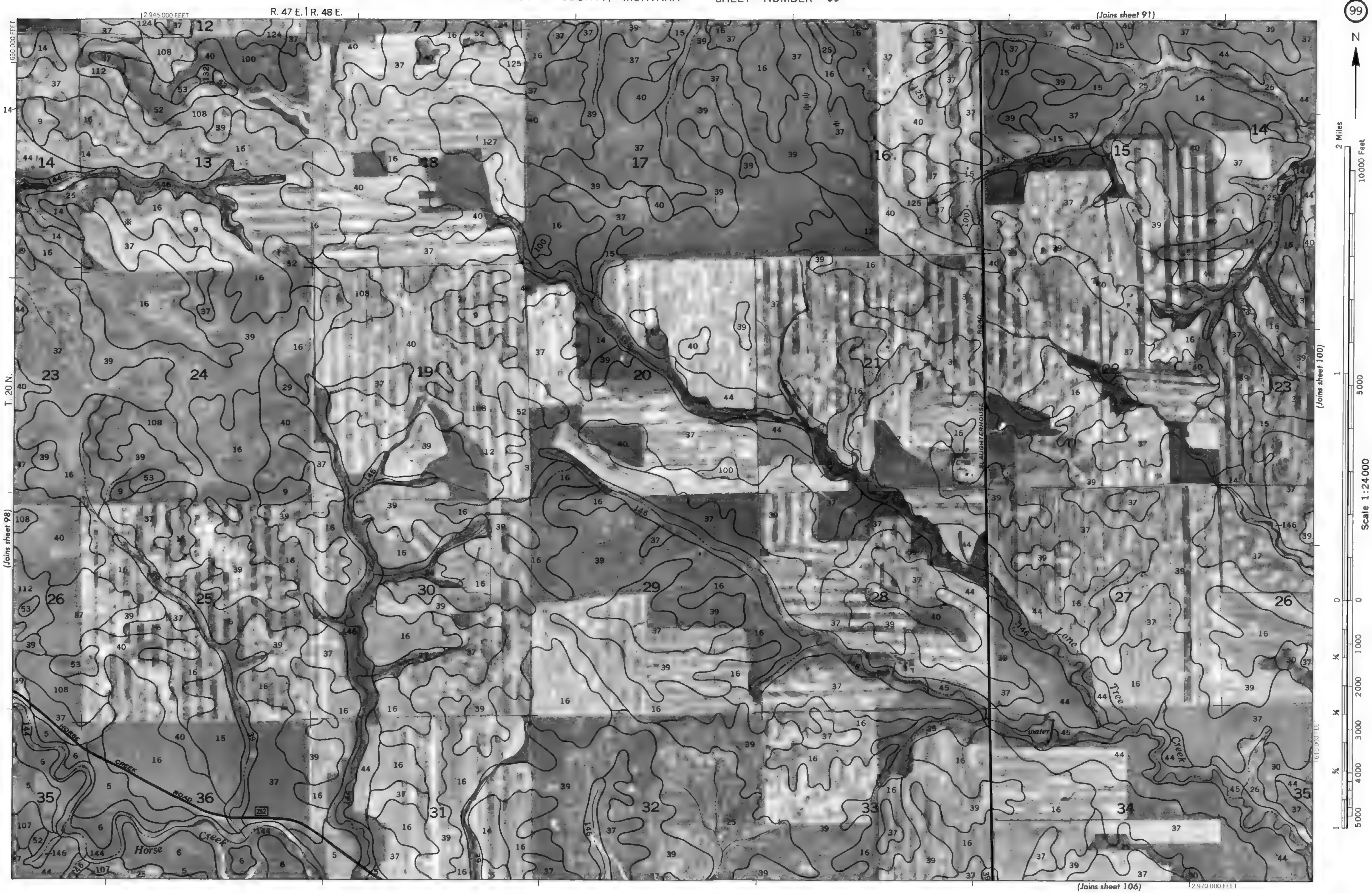
T. 20 N.

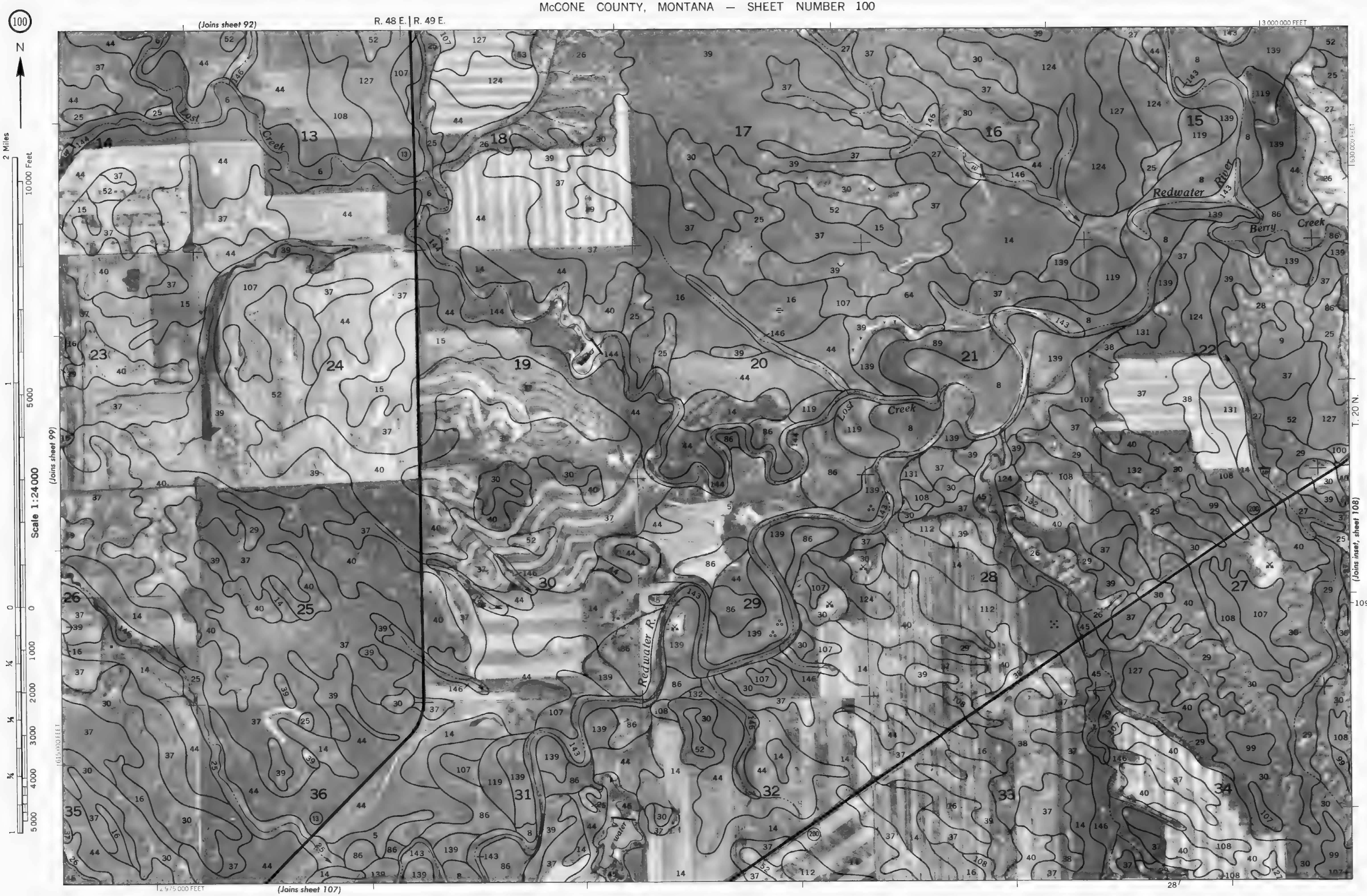
Scale 1:24000

2 Miles | 1 | 0 | ¼ | ½ | ¾ | 1

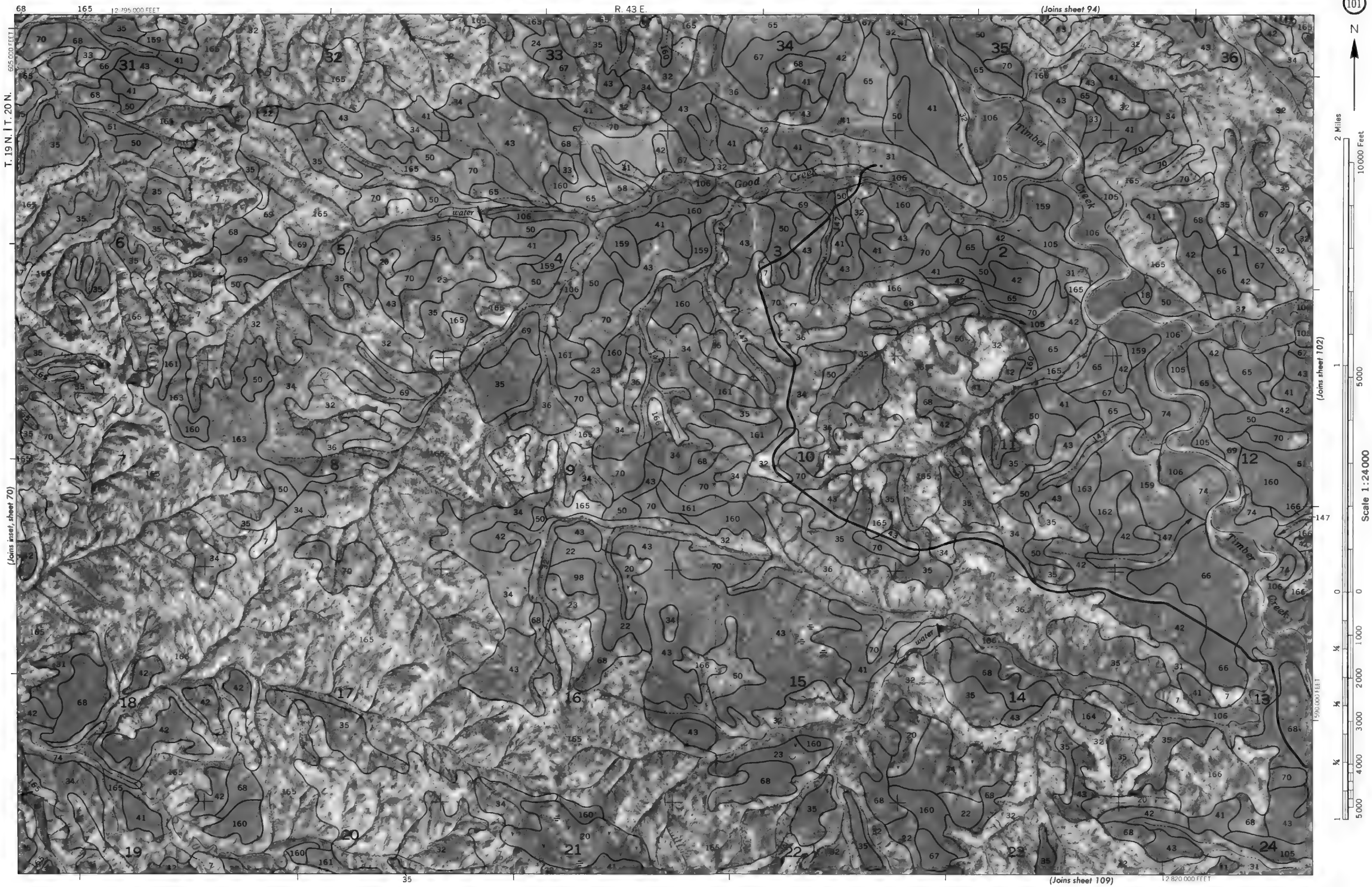
10 000 Feet | 5000 | 0 | 1000 | 2000 | 3000 | 4000 | 5000

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

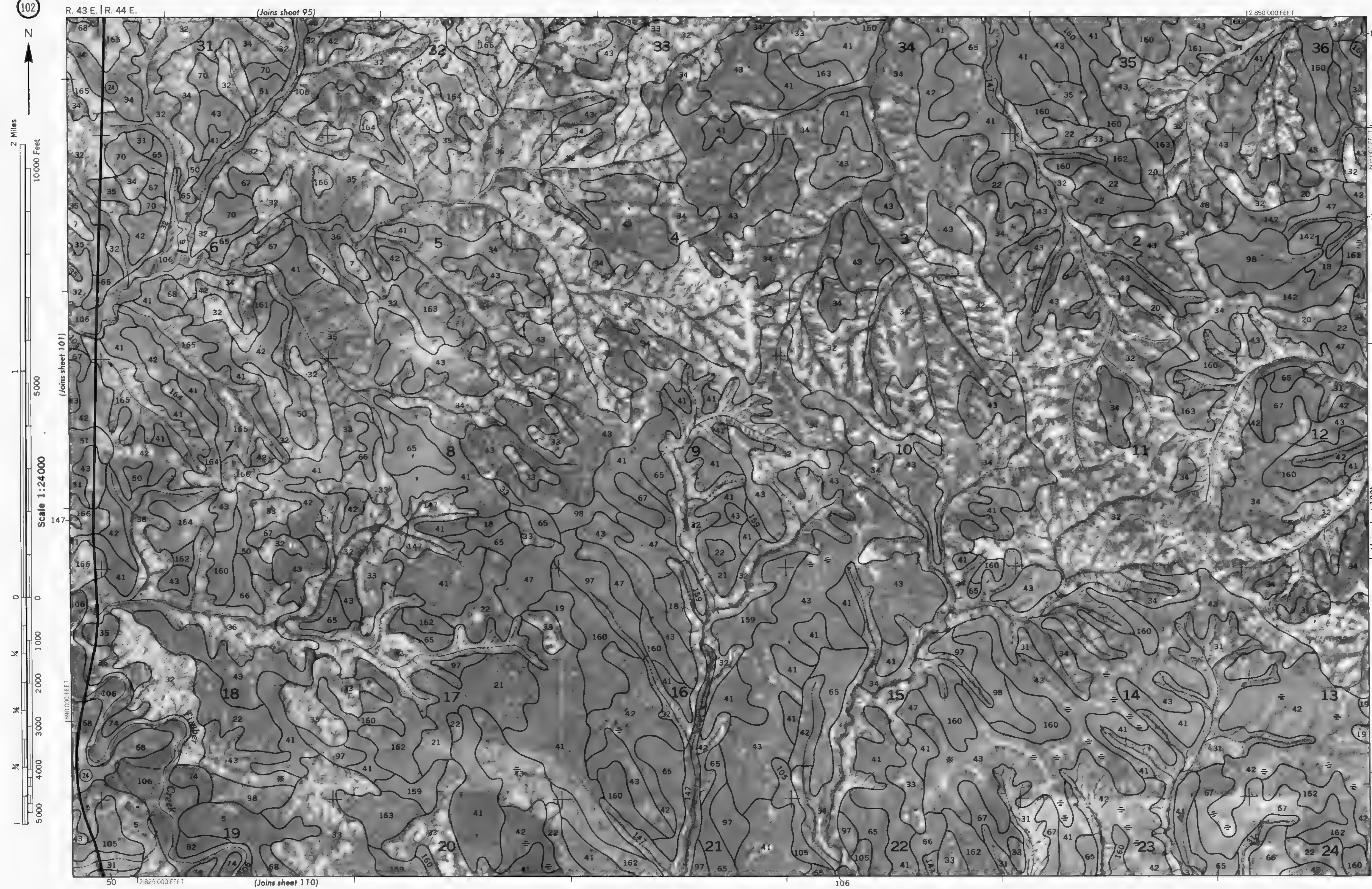

99
2 945 000 FEET
R. 47 E. | R. 48 E.
(Joins sheet 91)
630 000 FEET
T. 20 N.
(Joins sheet 98)
(Joins sheet 100)
(Joins sheet 106)
2 970 000 FEET
N
SLAUGHTERHOUSE ROAD
HORSE CREEK ROAD
Horse Creek
Lone Tree Creek
water
252
12
7
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
Scale 1:24000
2 Miles
1
0
10 000 Feet
5000
0
1000
2000
3000
4000
5000



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

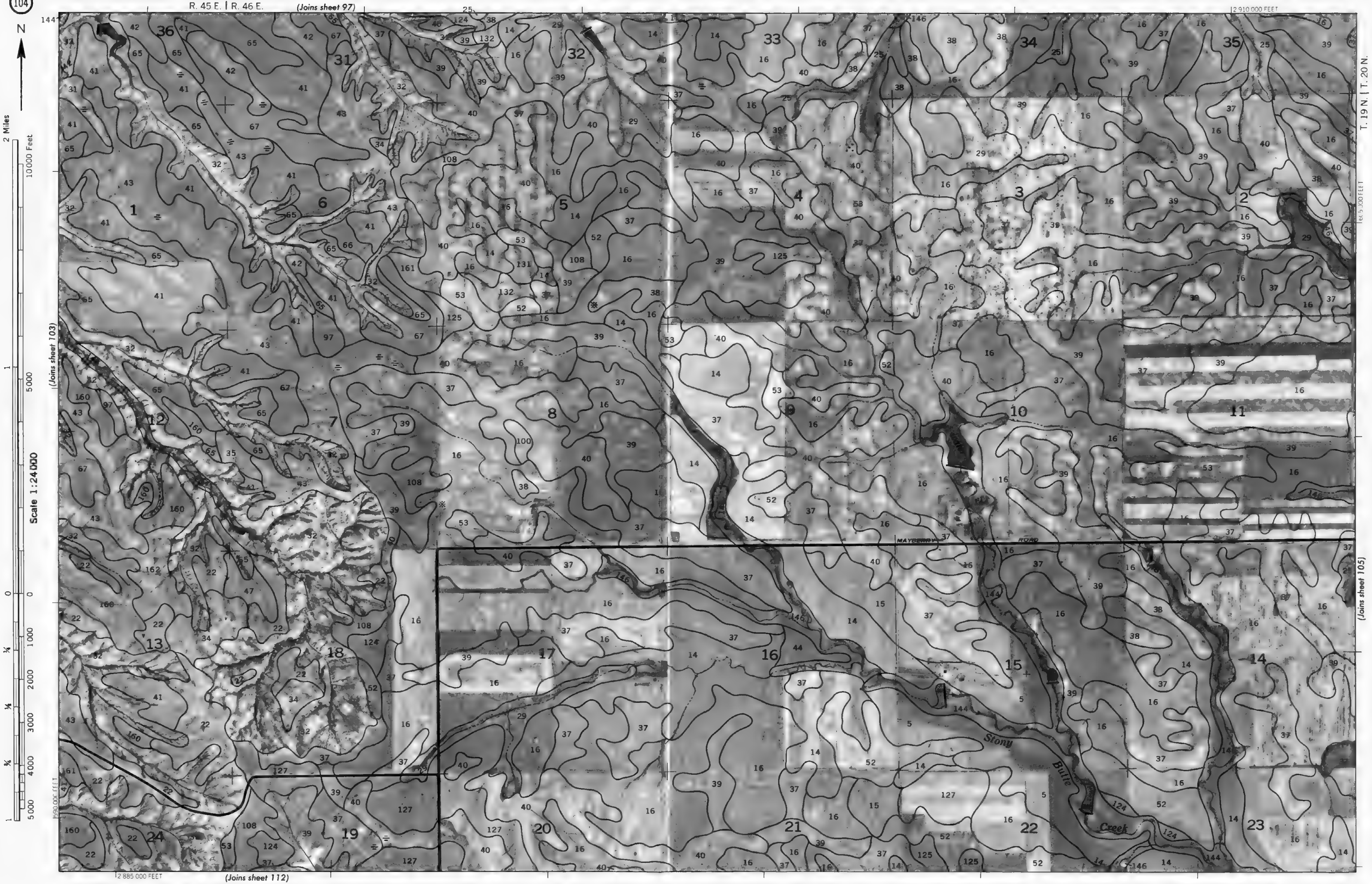


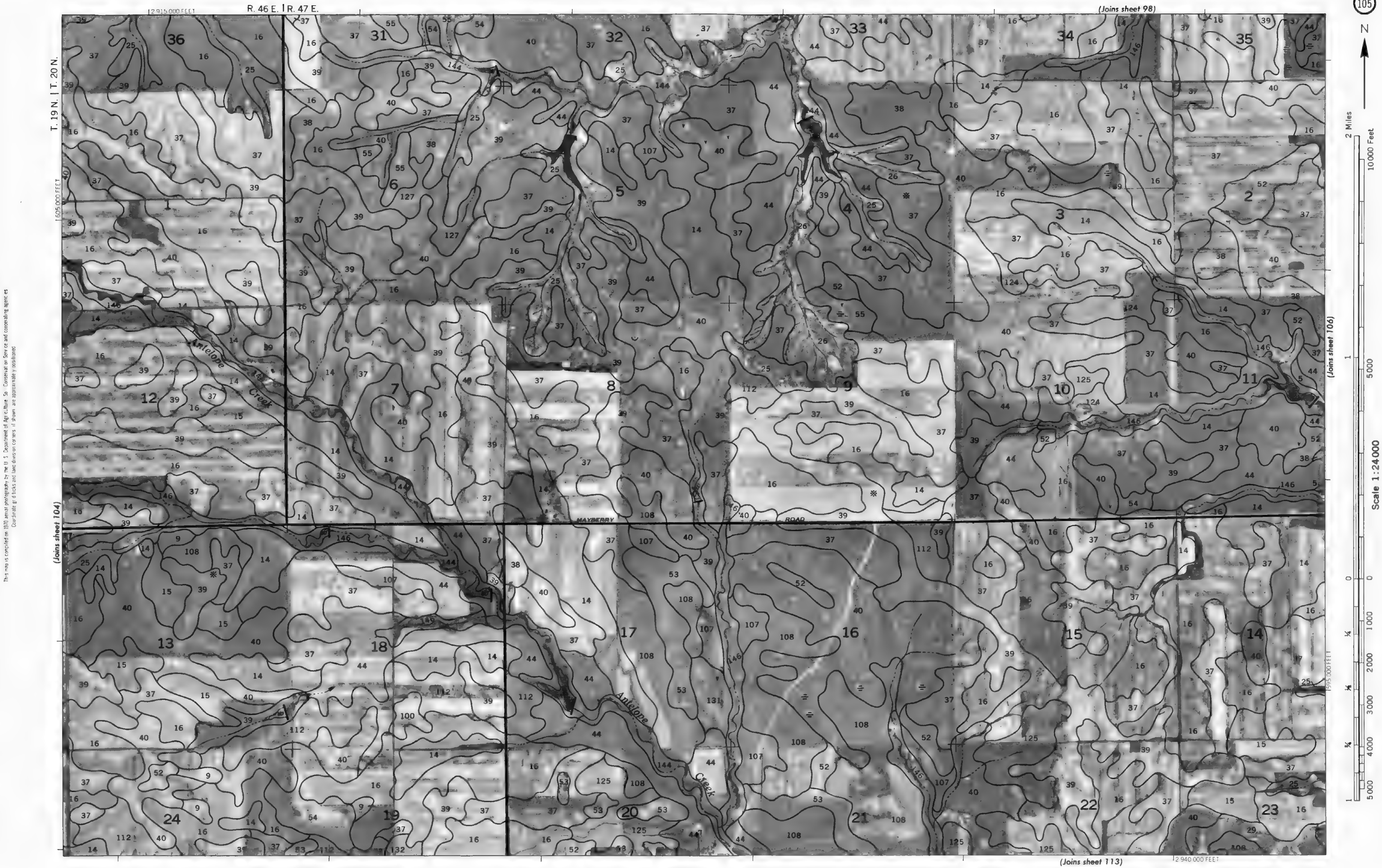
This map is compiled on 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



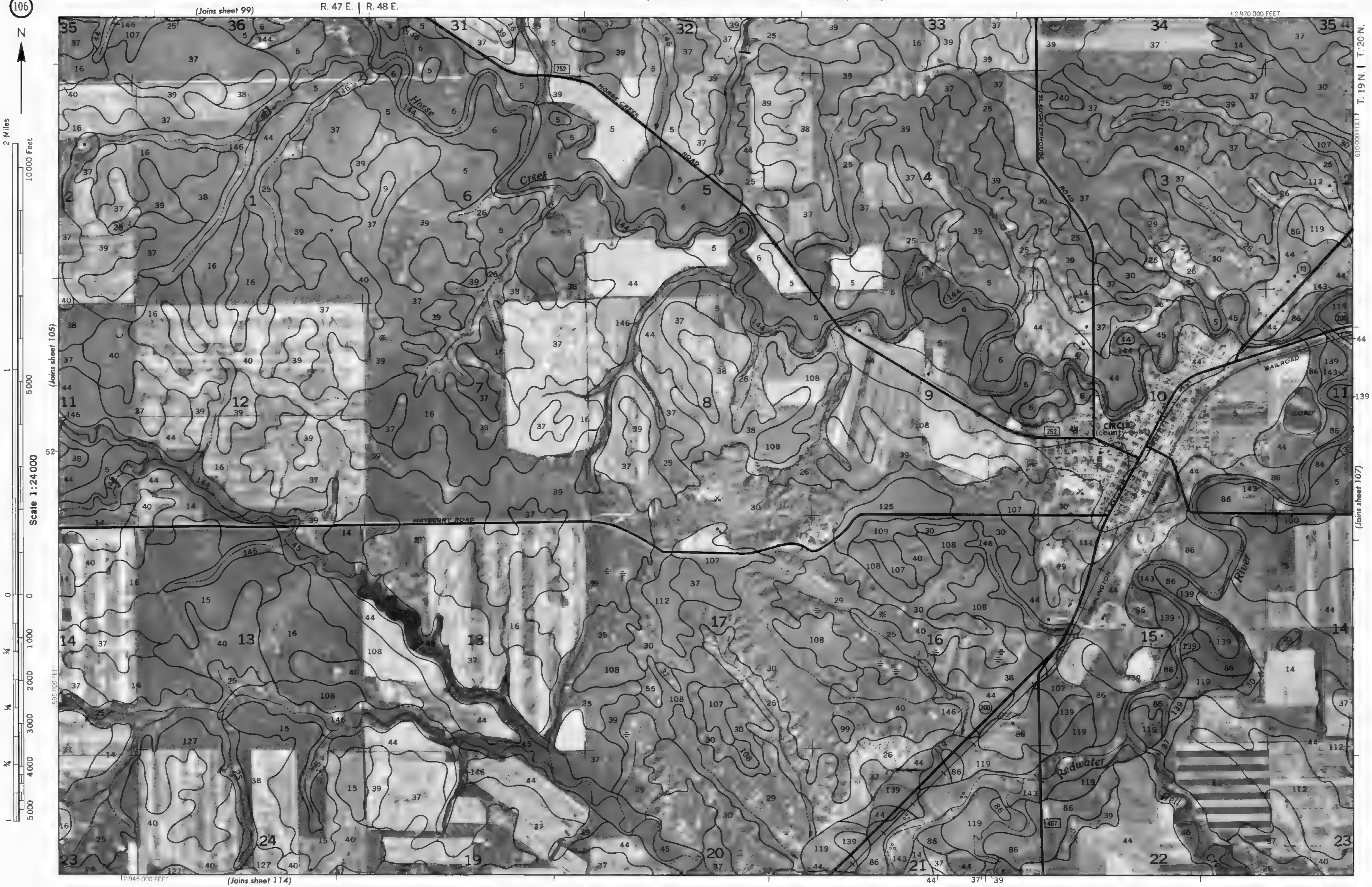
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


R. 44 E. | R. 45 E.
2 855 000 FEET
T. 19 N. | T. 20 N.
605 000 FEET
(Joins sheet 96)
(Joins sheet 104)
(Joins sheet 111)
(Joins sheet 102)
2 880 000 FEET
N
Nelson Creek
Reservoir
Scale 1:24000
2 Miles
10000 Feet
1
5000
0
1000
2000
3000
4000
5000
¼
½
¾

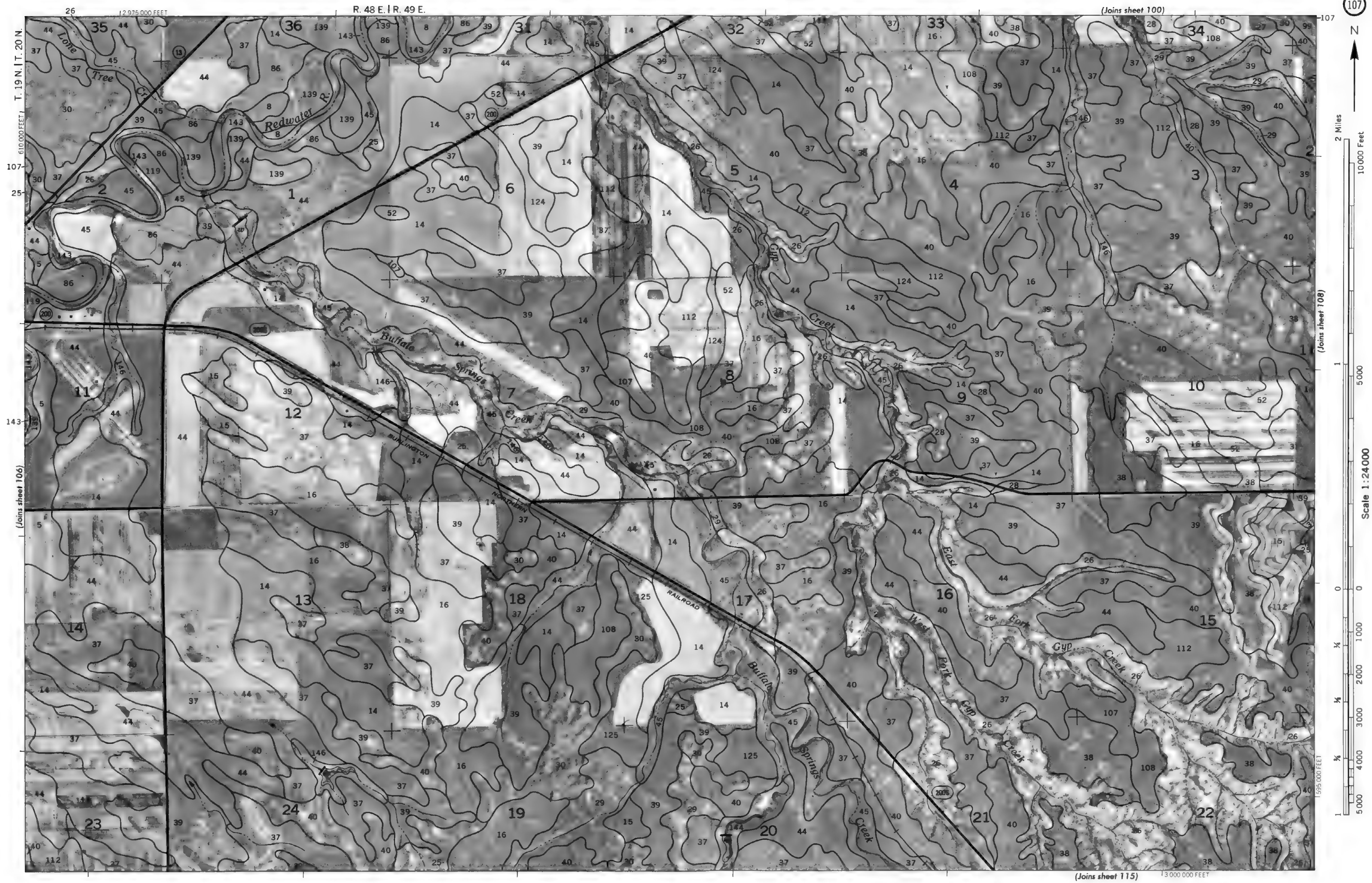

104
N
R. 45 E. | R. 46 E.
(Joins sheet 97)
(Joins sheet 103)
(Joins sheet 105)
(Joins sheet 112)
T. 19 N. | T. 20 N.
2 910 000 FEET
2 885 000 FEET
Scale 1:24 000
2 Miles
10000 Feet
MAYBERRY ROAD
Stony Butte Creek


105
R. 46 E. | R. 47 E.
T. 20 N. | T. 19 N.
2 915 000 FEET
605 000 FEET
595 000 FEET
2 940 000 FEET
(Joins sheet 98)
(Joins sheet 104)
(Joins sheet 106)
(Joins sheet 113)
Antelope Creek
MAYBERRY ROAD
N
Scale 1:24000
2 Miles
10000 Feet
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

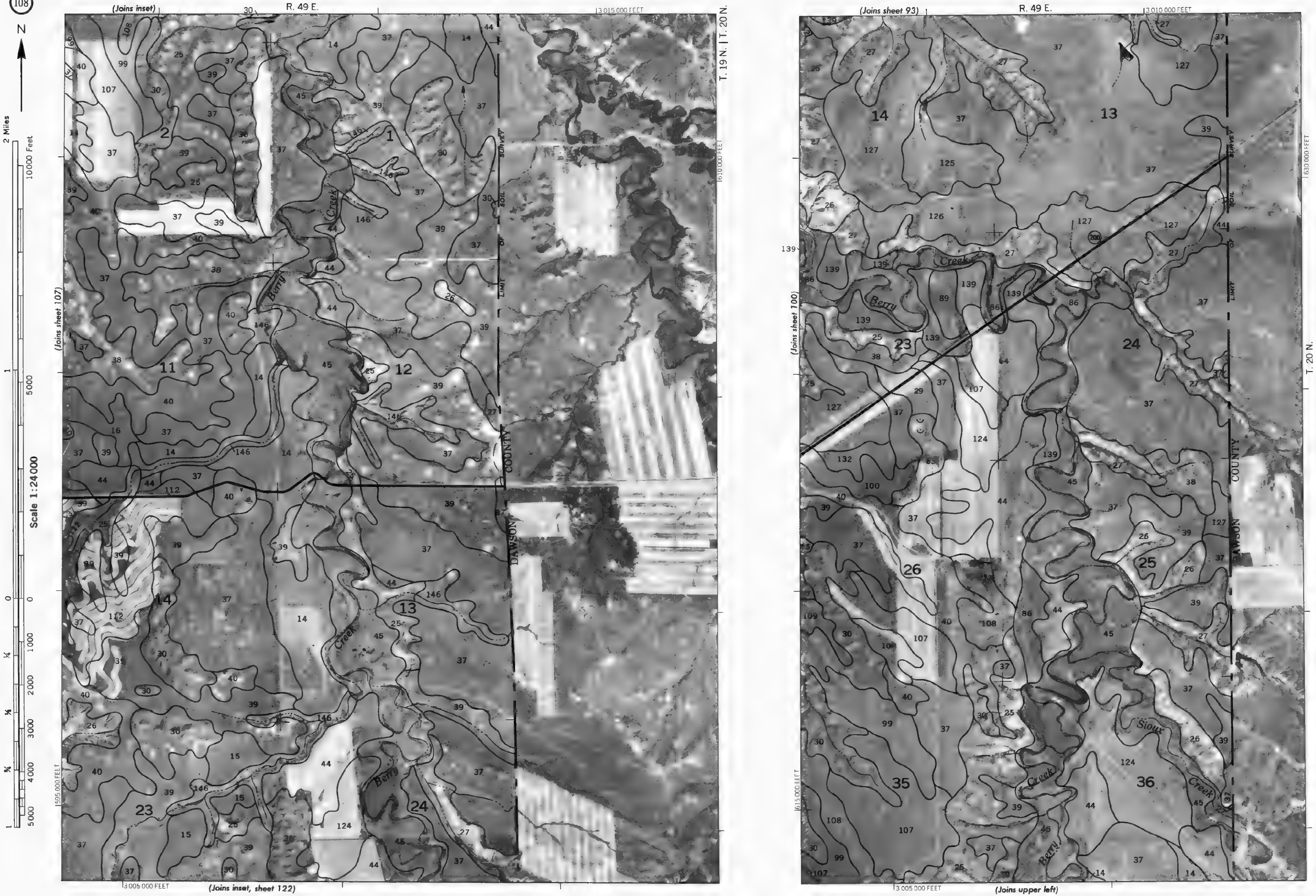
McCONE COUNTY, MONTANA — SHEET NUMBER 106



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

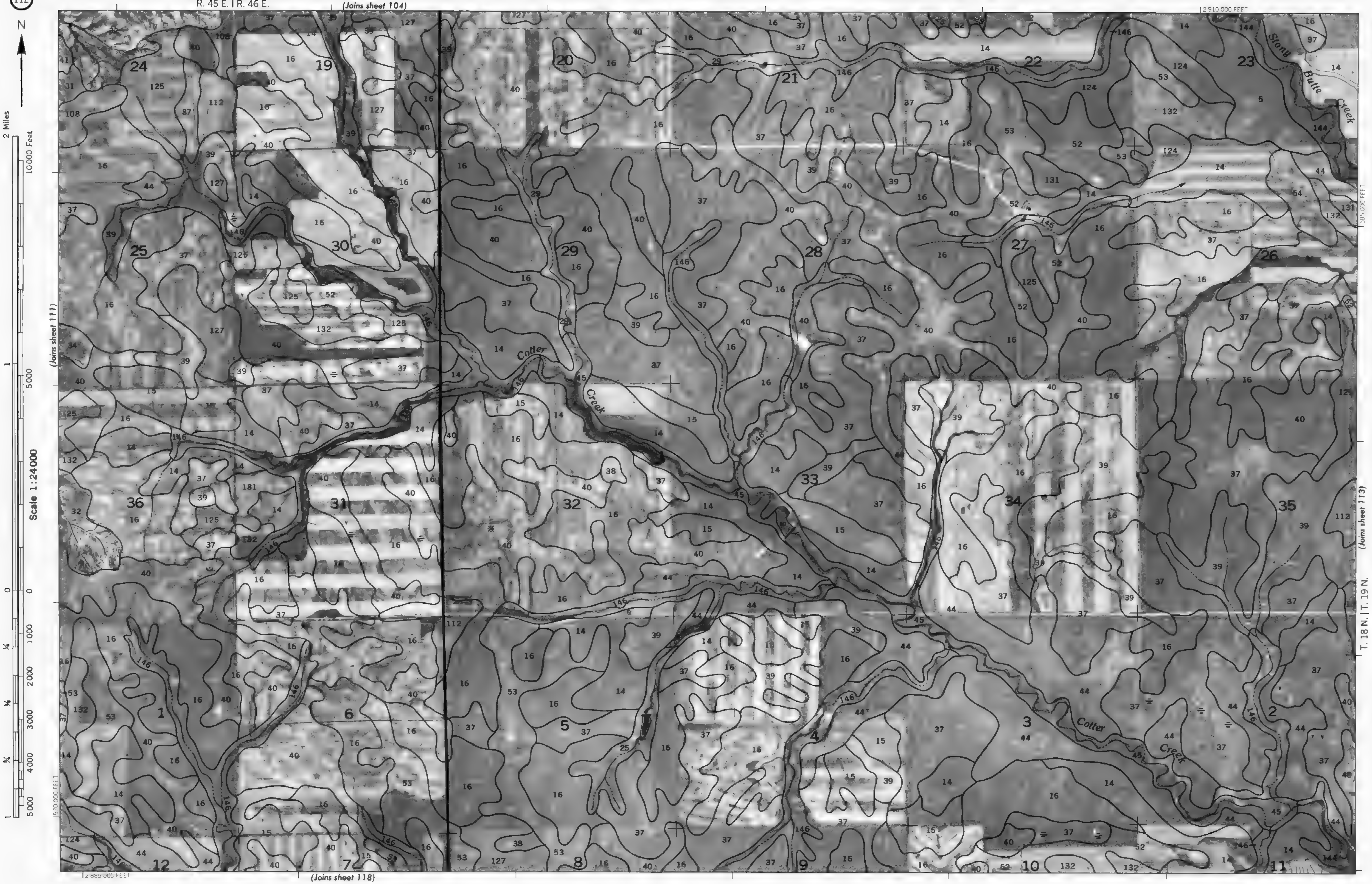


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 110


R. 44 E. | R. 45 E.
2 855 000 FEET
(Joins sheet 103)
(Joins sheet 110)
(Joins sheet 112)
(Joins sheet 117)
585 000 FEET
570 000 FEET
2 880 000 FEET
T. 18 N. | T. 19 N.
Soda
Creek
N
2 Miles
10 000 Feet
Scale 1:24 000

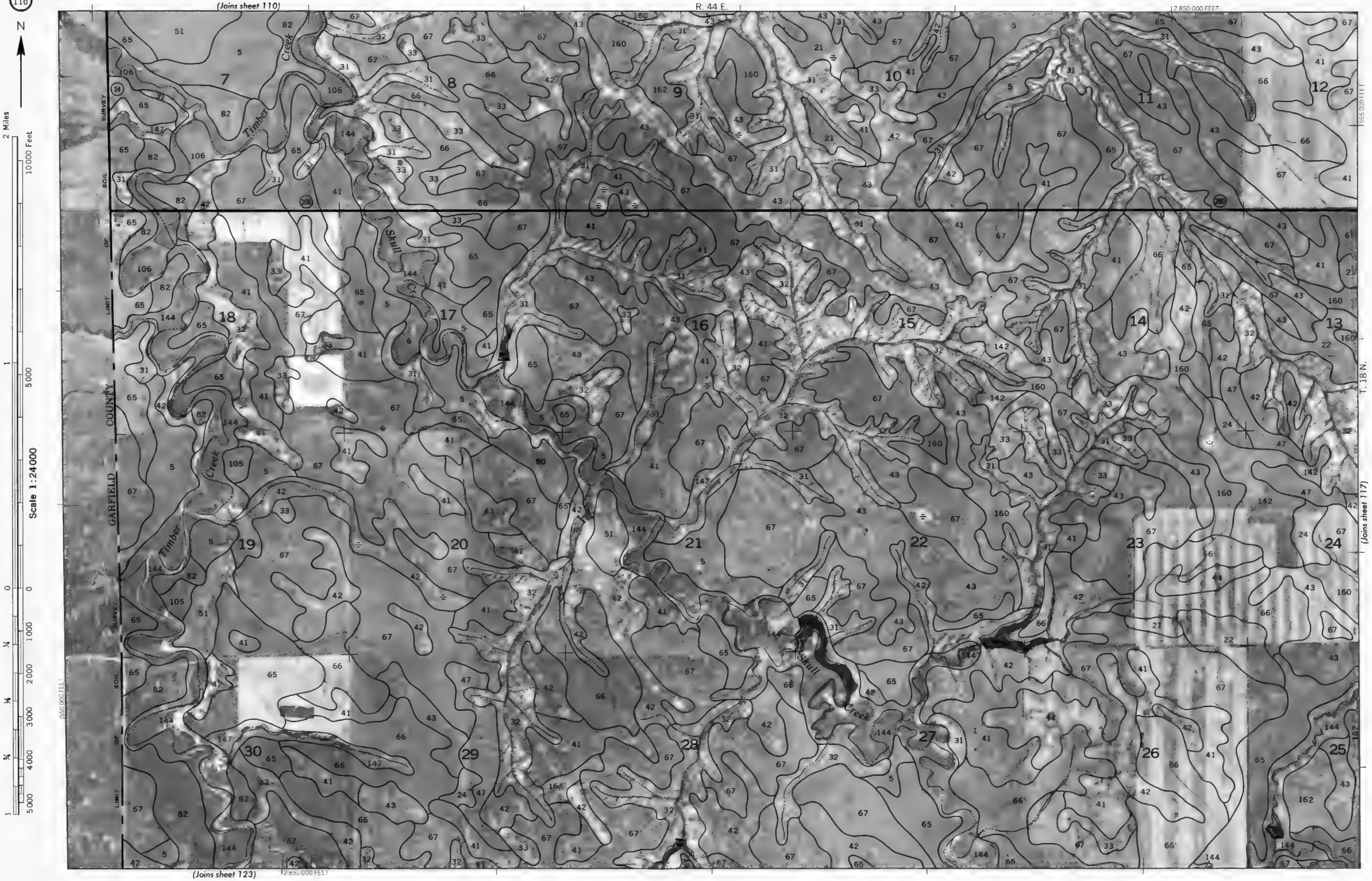

112
N
R. 45 E. | R. 46 E.
(Joins sheet 104)
(Joins sheet 111)
(Joins sheet 113)
(Joins sheet 118)
T. 18 N. | T. 19 N.
2 910 000 FEET
585 000 FEET
570 000 FEET
2 885 000 FEET
Scale 1:24000
2 Miles
10000 Feet
Cotter Creek
Stony Butte Creek

(113)

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


114
N
2 Miles
10 000 Feet
Scale 1:24000
(Joins sheet 106)
(Joins sheet 113)
(Joins sheet 115)
(Joins sheet 120)
R. 47 E. | R. 48 E.
T. 19 N.
T. 18 N.
Redwater River
McCune Creek
Antelope Creek
Hell Creek
Dry Ash Creek
BURLINGTON NORTHERN RAILROAD
water
200
467

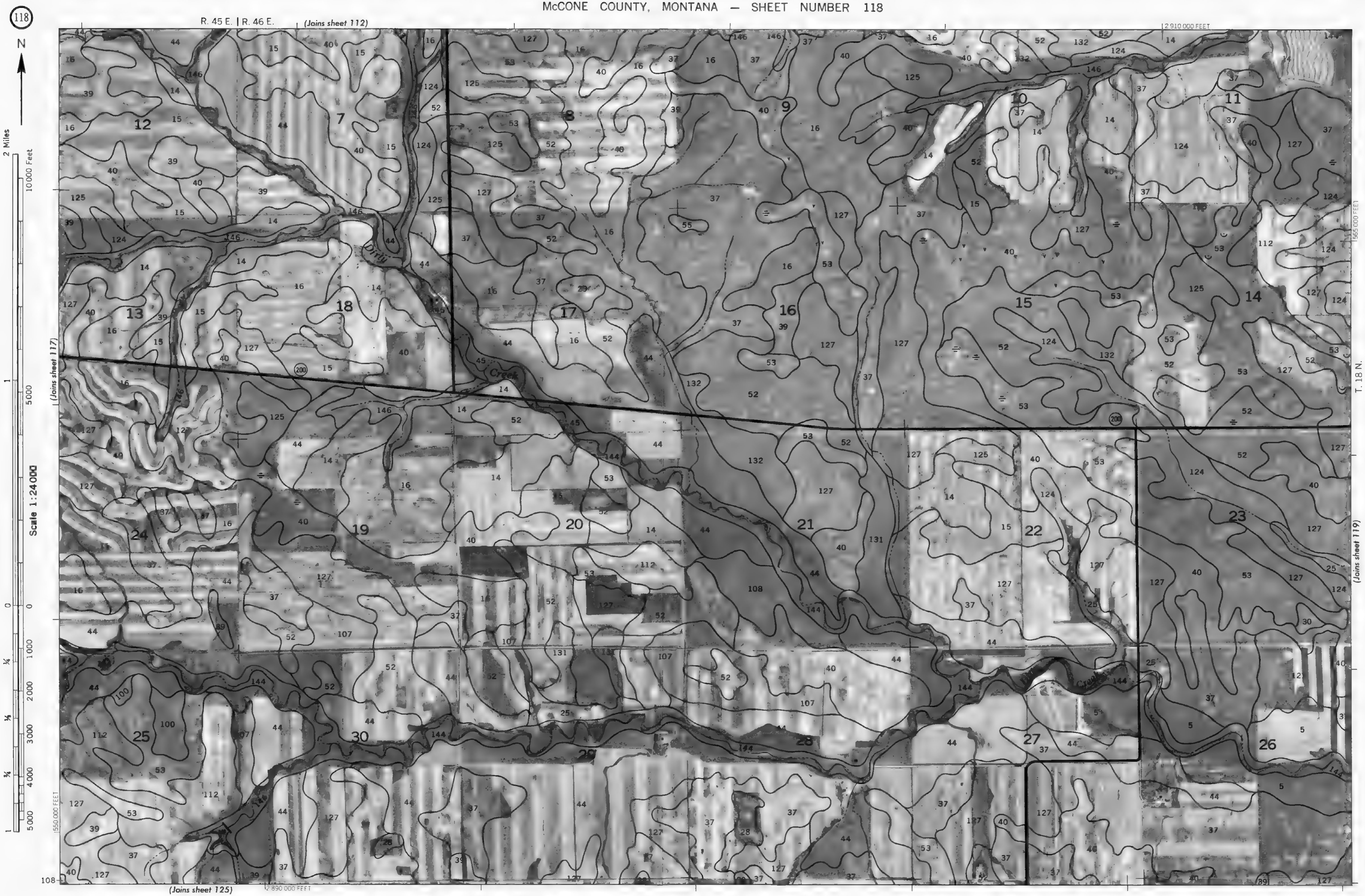
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land divisions, if shown, are approximately positioned.



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 117

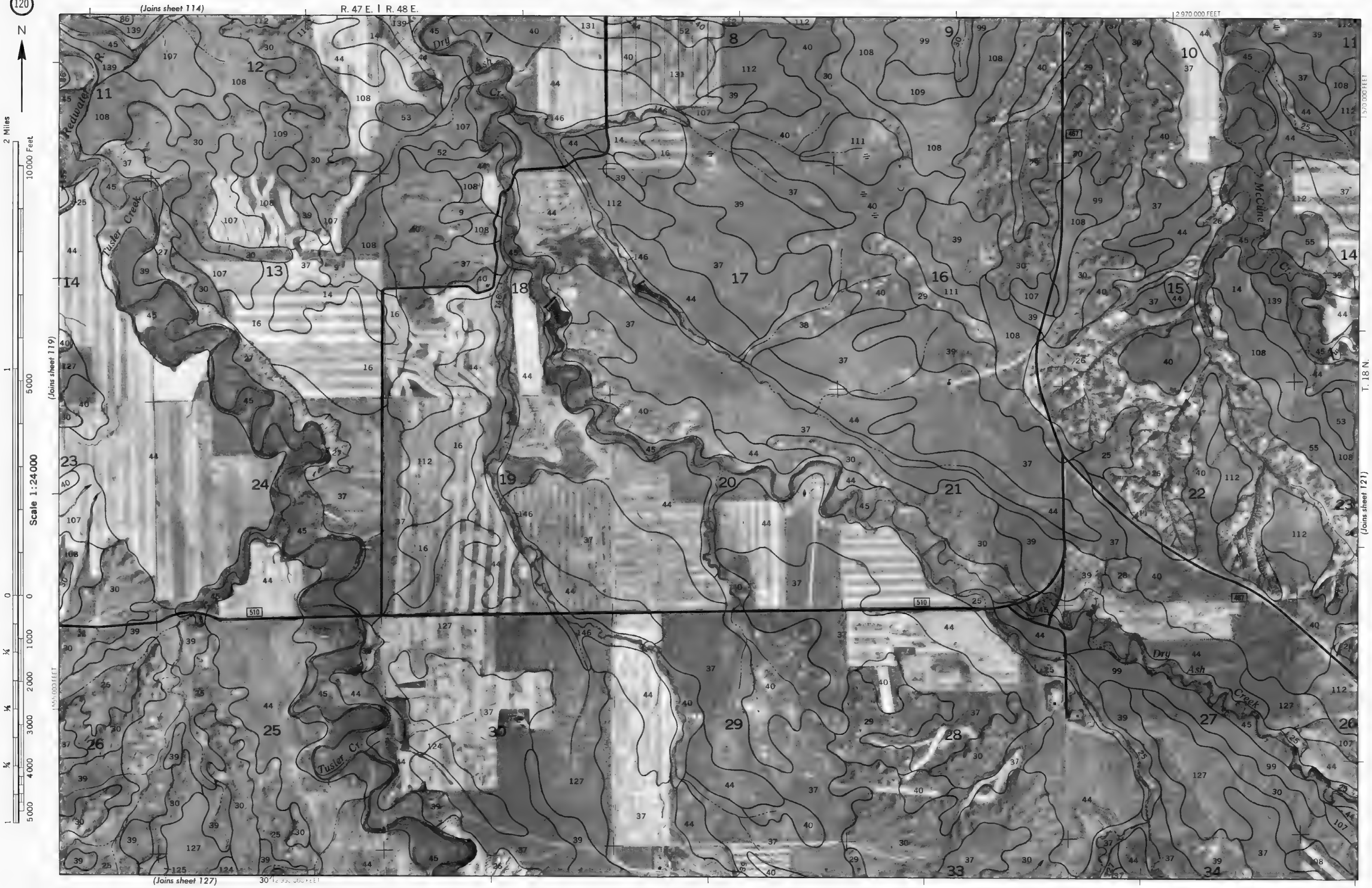
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

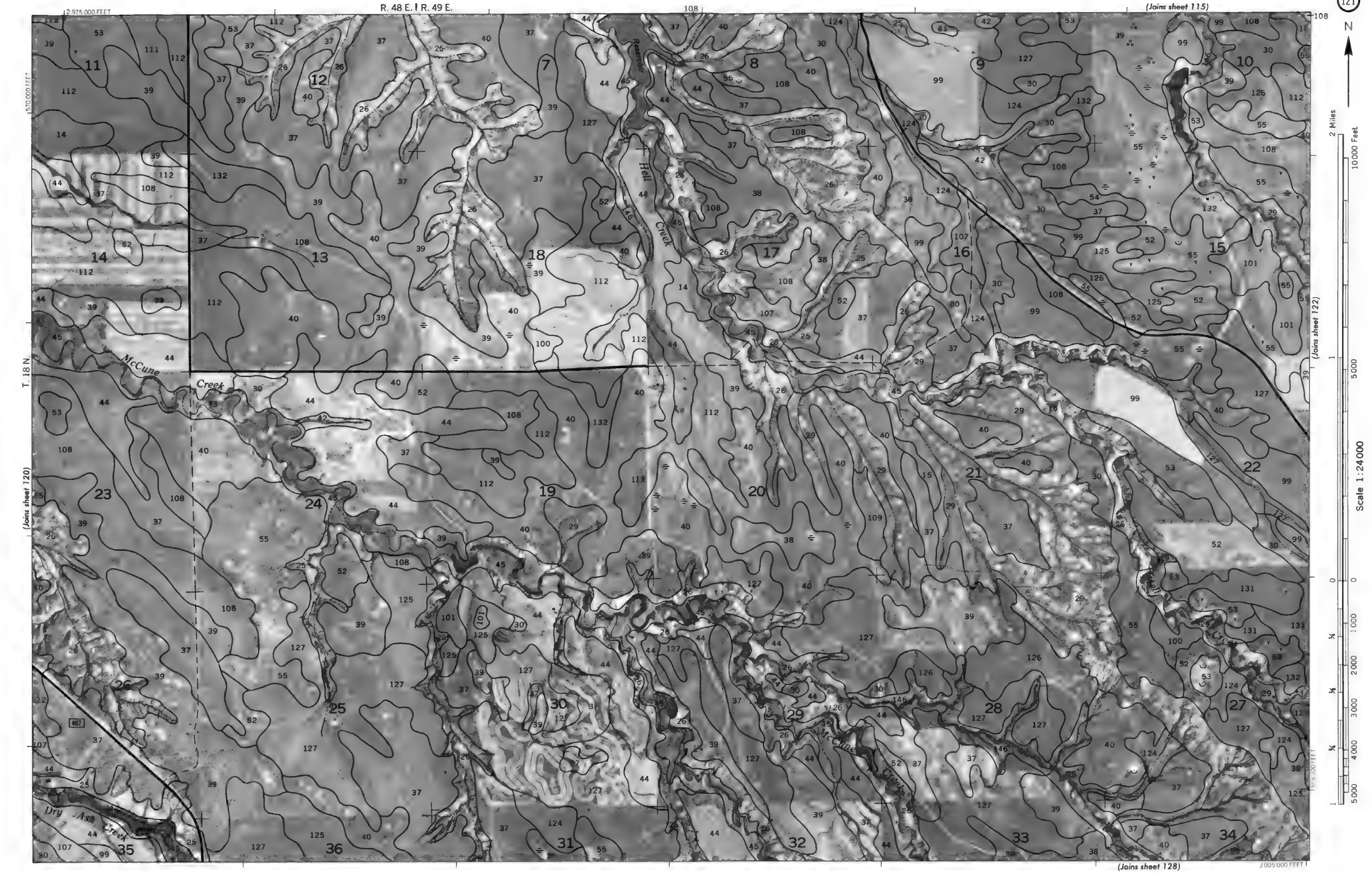


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1978 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

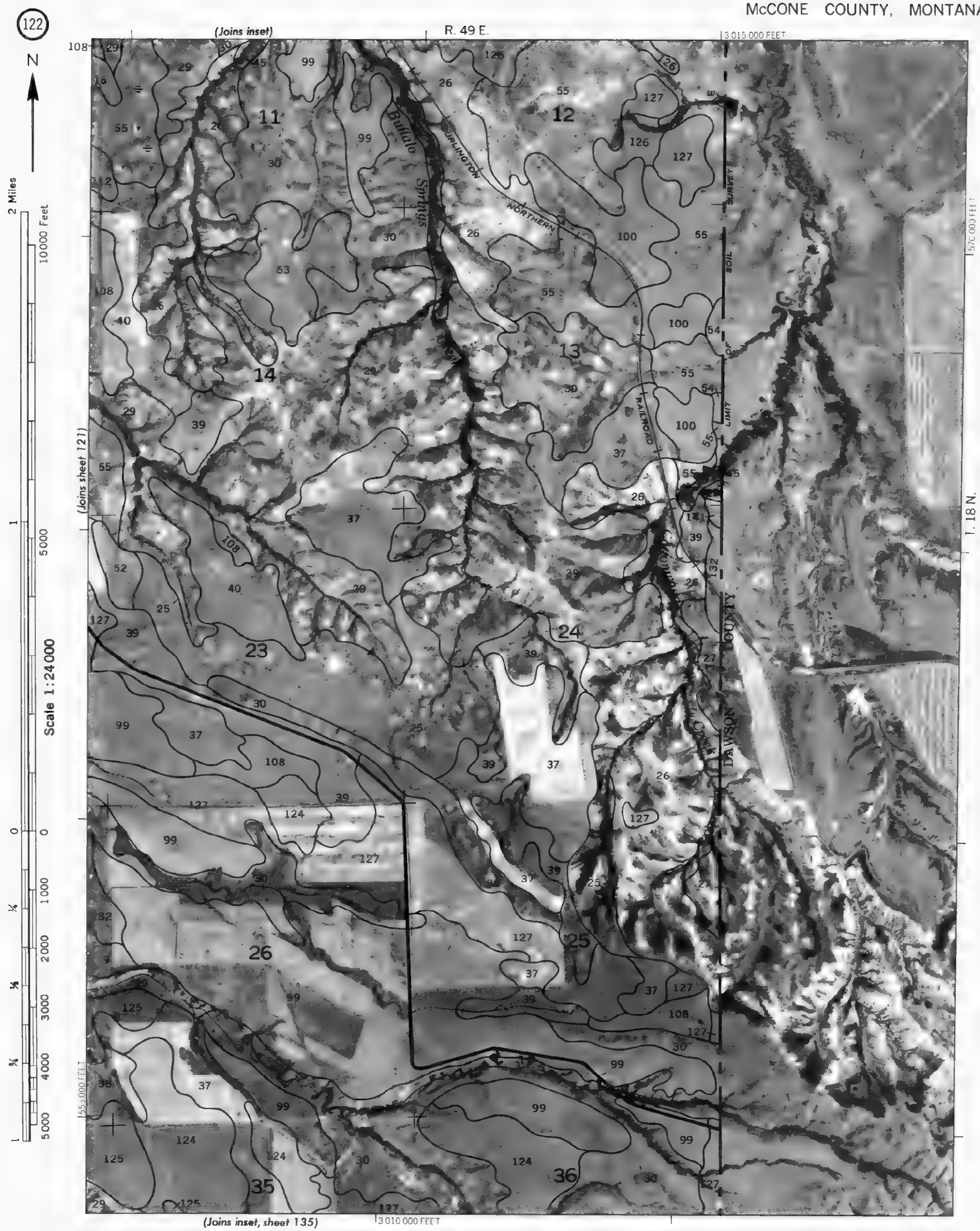
McCONE COUNTY, MONTANA — SHEET NUMBER 120



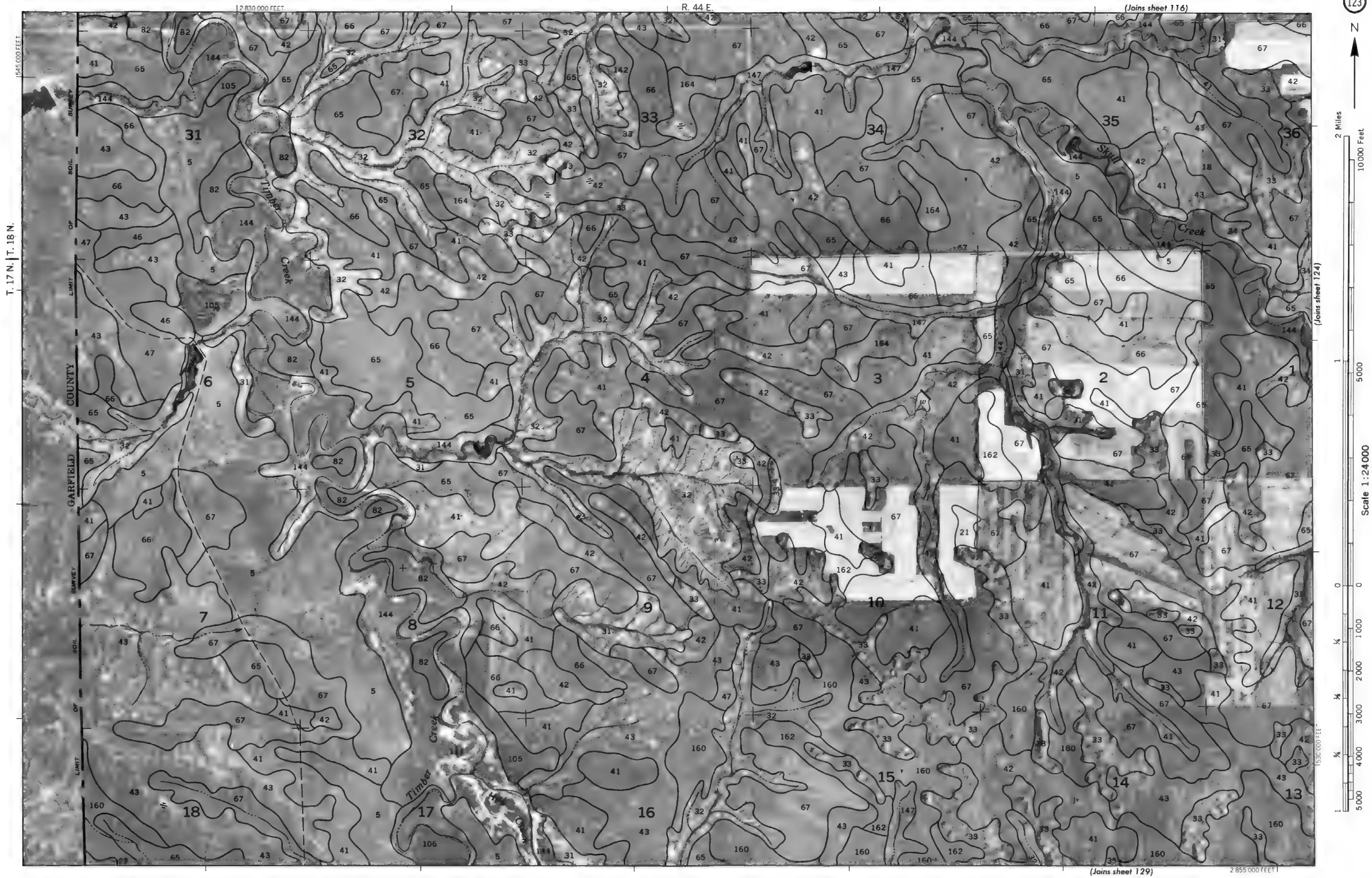


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 122



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



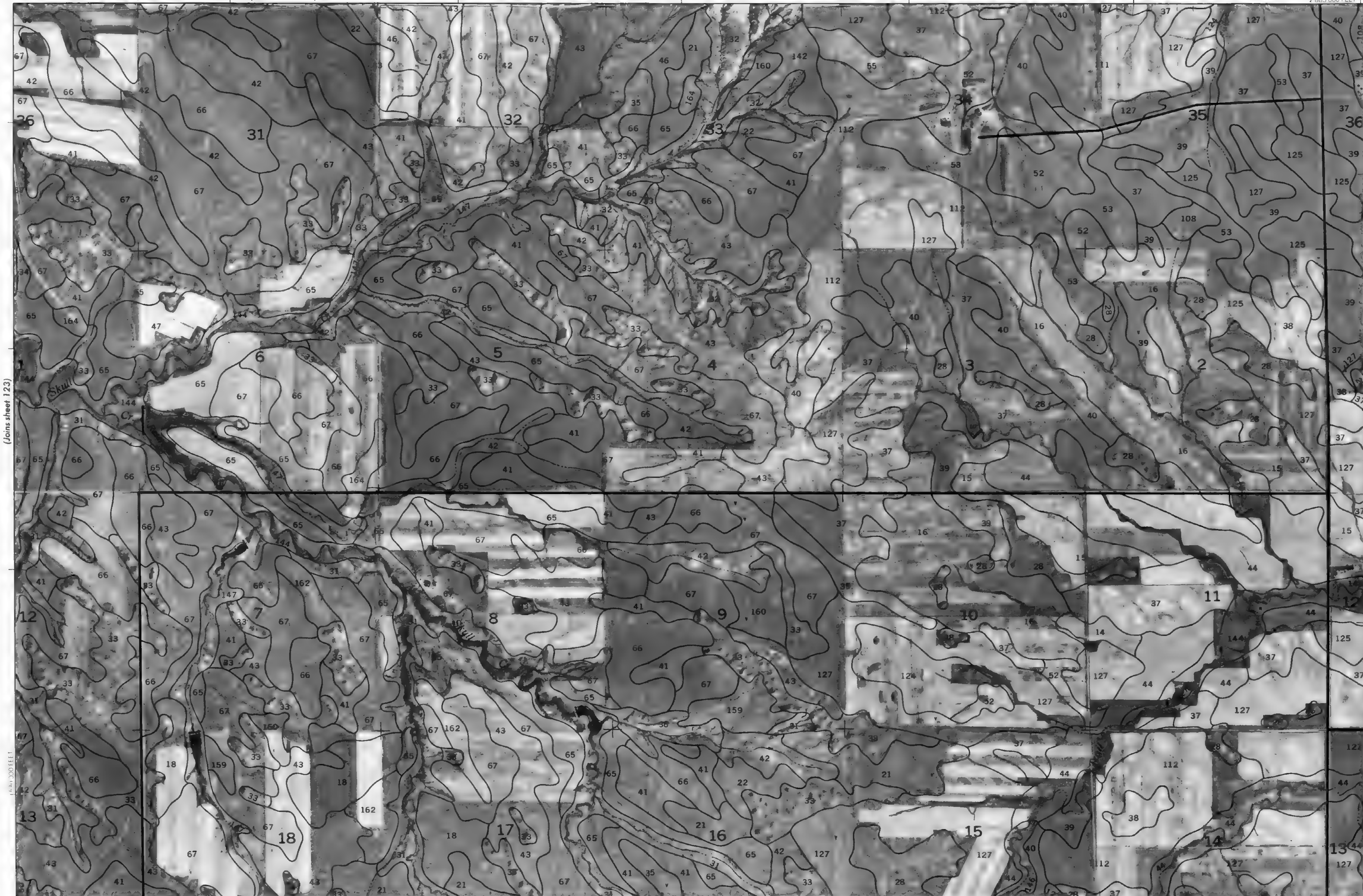
This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

124

N

R. 44 E. | R. 45 E.

(Joins sheet 117)



Scale 1:24 000

2 Miles

10 000 Feet

(Joins sheet 123)

T. 17 N. | T. 18 N.

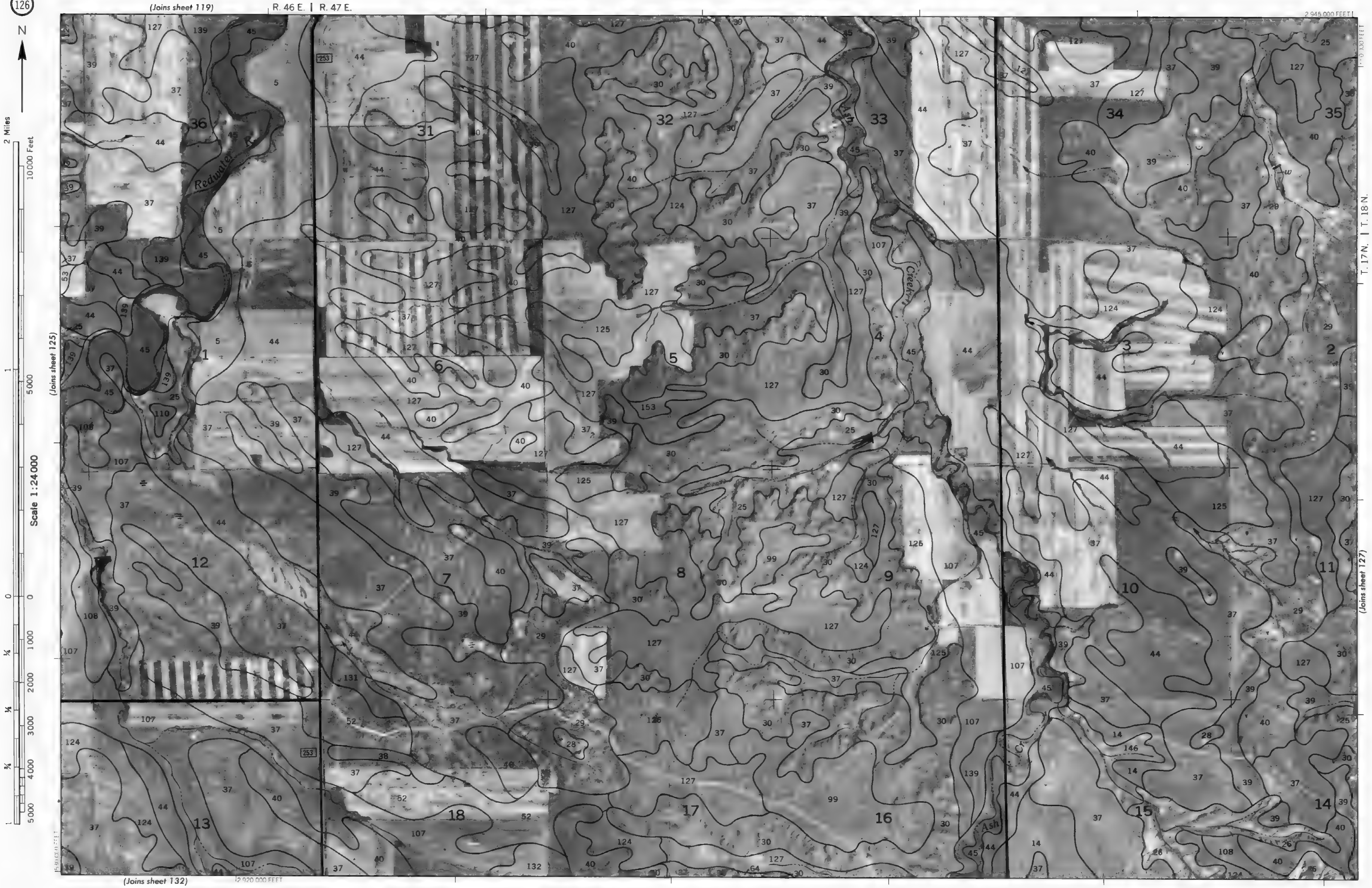
(Joins sheet 125)

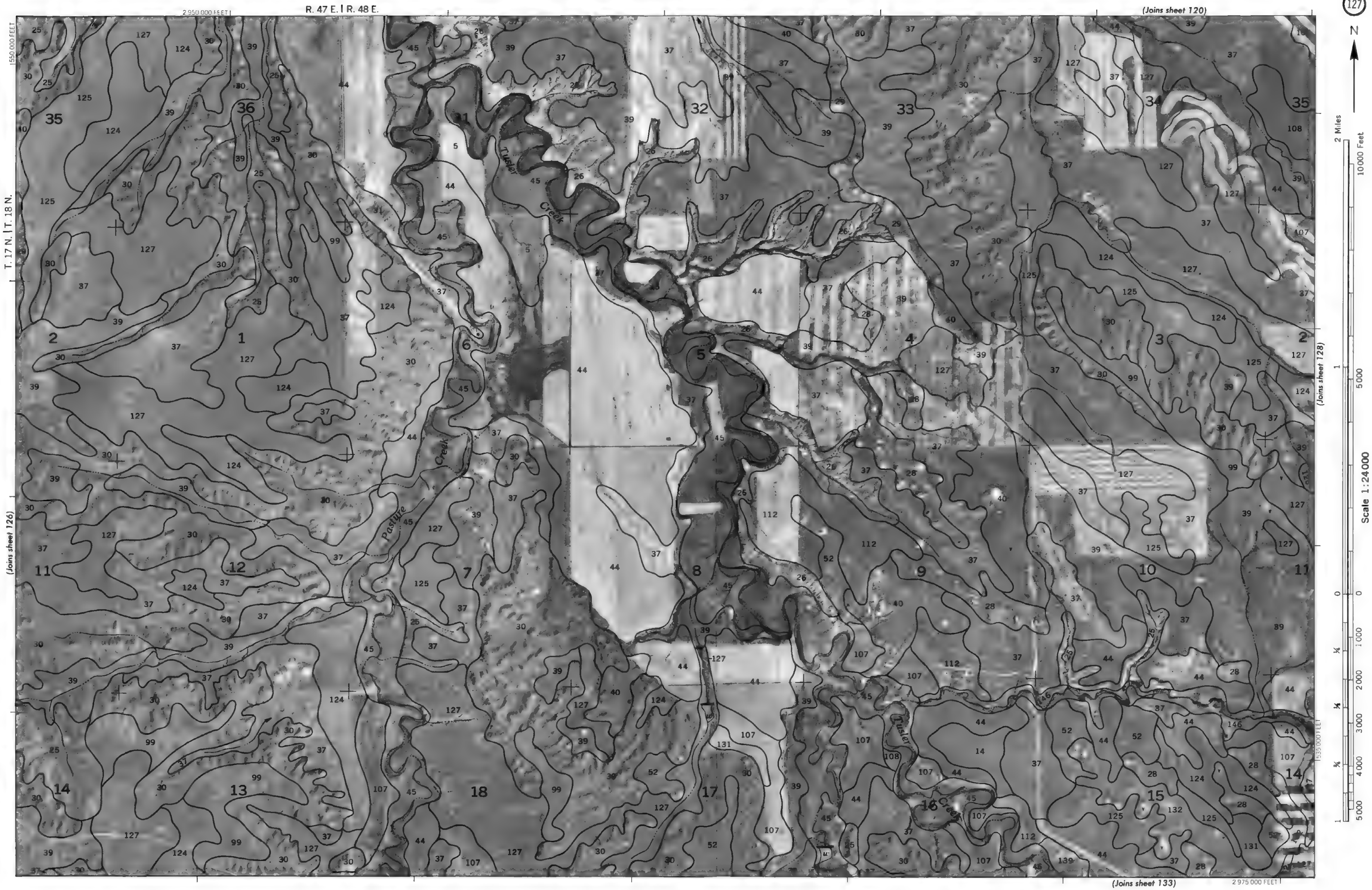
(Joins sheet 130)

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


125
R. 45 E. | R. 46 E.
T. 18 N. | T. 19 N.
(Joins sheet 118)
(Joins sheet 126)
(Joins sheet 124)
(Joins sheet 131)
Trail Creek
Redwater River
Duck Creek
JORDAN'S DAM
Reservoir
N
Scale 1:24 000
2 Miles
10000 Feet

McCONE COUNTY, MONTANA — SHEET NUMBER 126



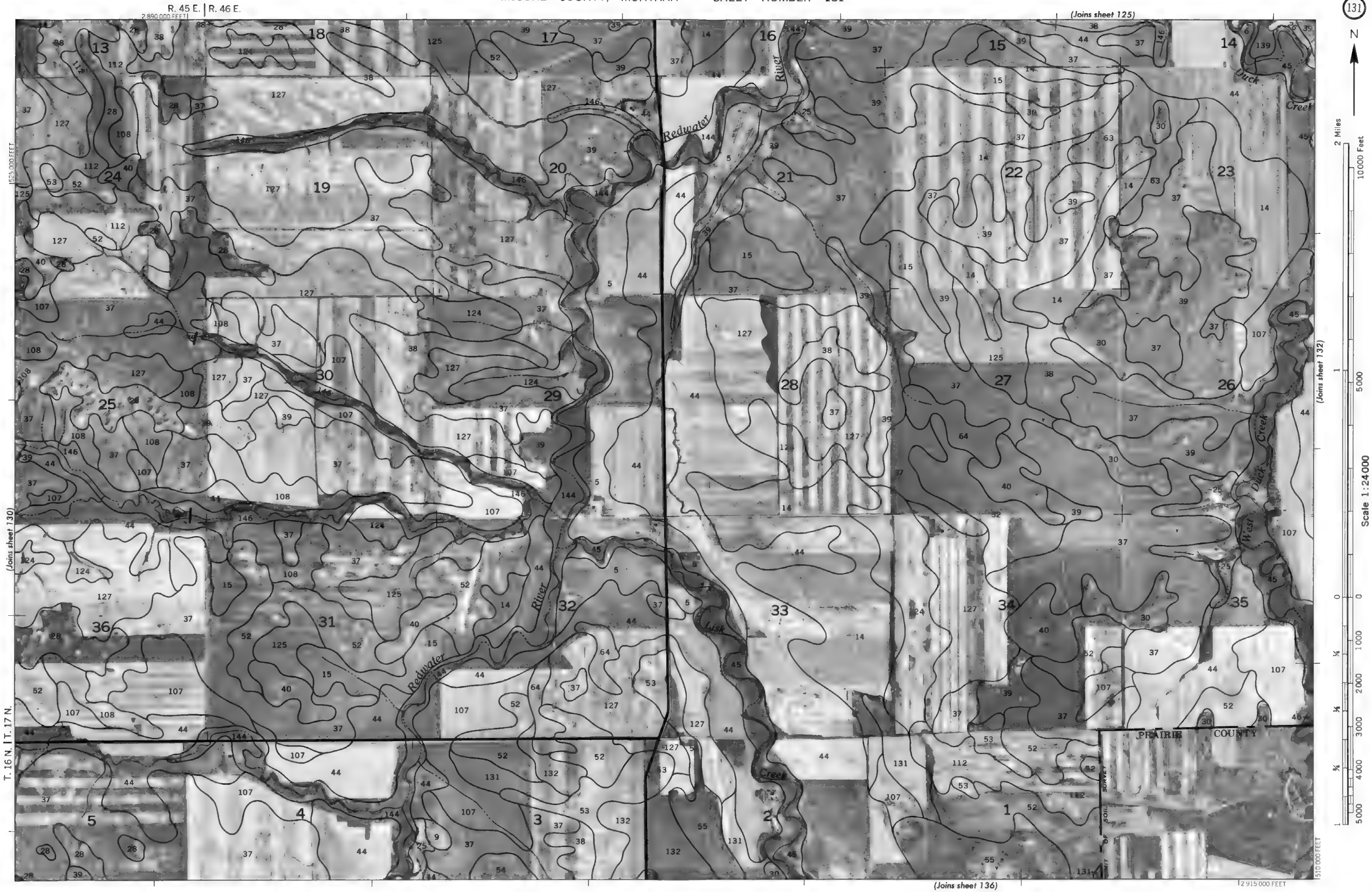


This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


128
N
(Joins sheet 121)
R. 48 E. | R. 49 E.
(Joins sheet 127)
(Joins inset, sheet 135)
(Joins sheet 134)
T. 17 N. | T. 18 N.
Scale 1:24 000
2 Miles
10 000 Feet
5000
0
1000
2000
3000
4000
5000
Ash Creek
2 980 000 FEET

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


R. 44 E. | R. 45 E.
(Joins sheet 124)
(Joins sheet 129)
(Joins sheet 131)
(Joins inset, sheet 53)
N
2 Miles
10000 Feet
Scale 1:24 000
2 885 000 FEET
525 000 FEET
510 000 FEET
2 860 000 FEET
Hay Creek
PRAIRIE COUNTY
LIMIT OF SOIL SURVEY
T. 17 N.
T. 16 N.

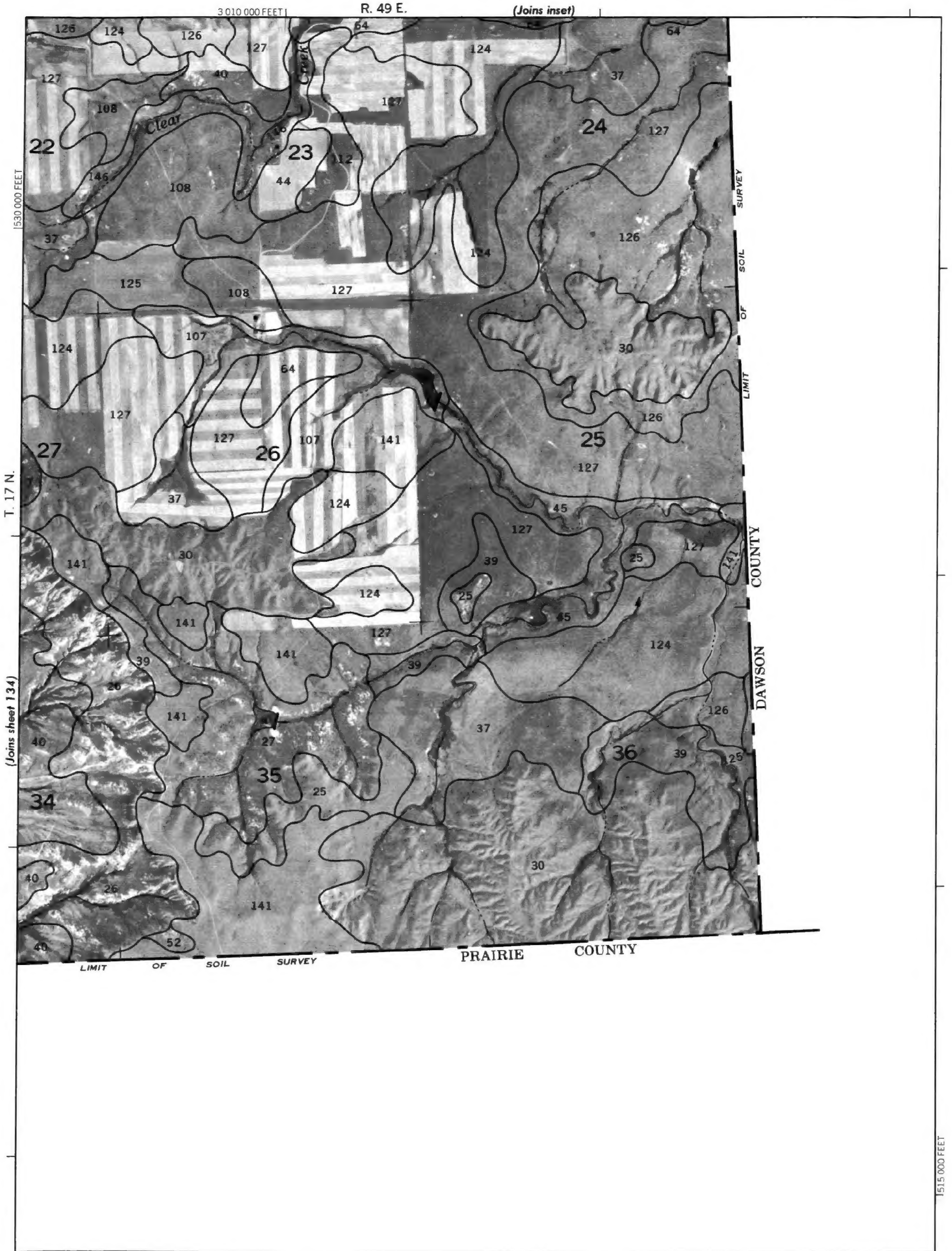


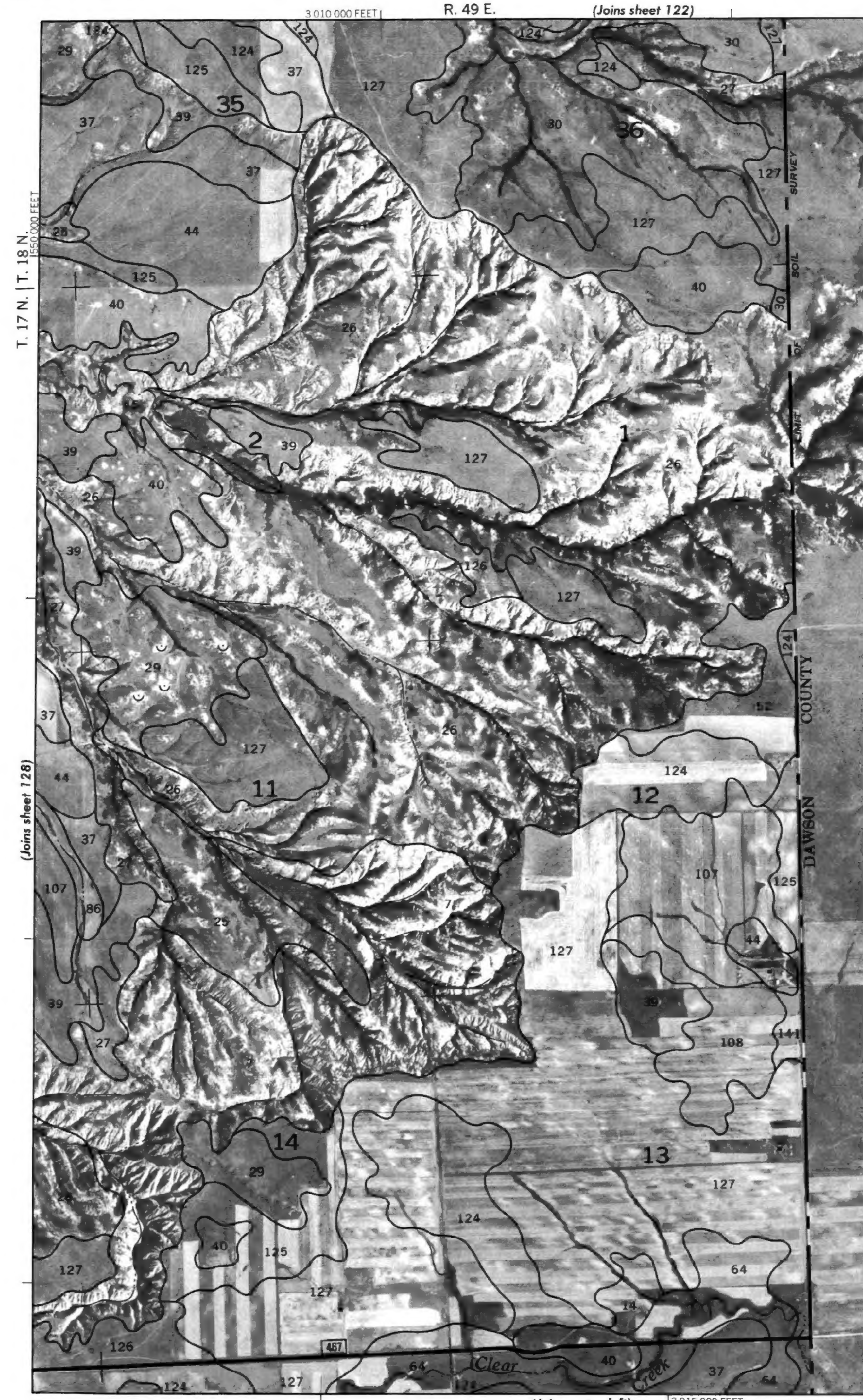
This [map] is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

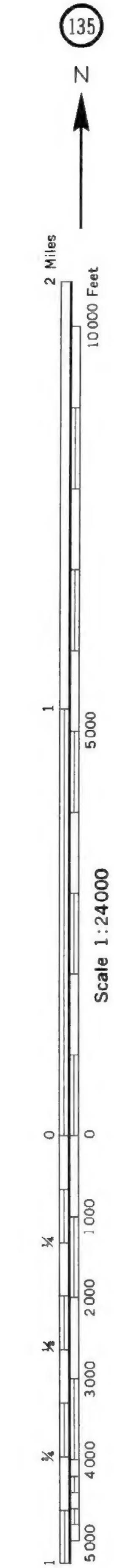
This map is compiled on 1980 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Th[redacted]is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



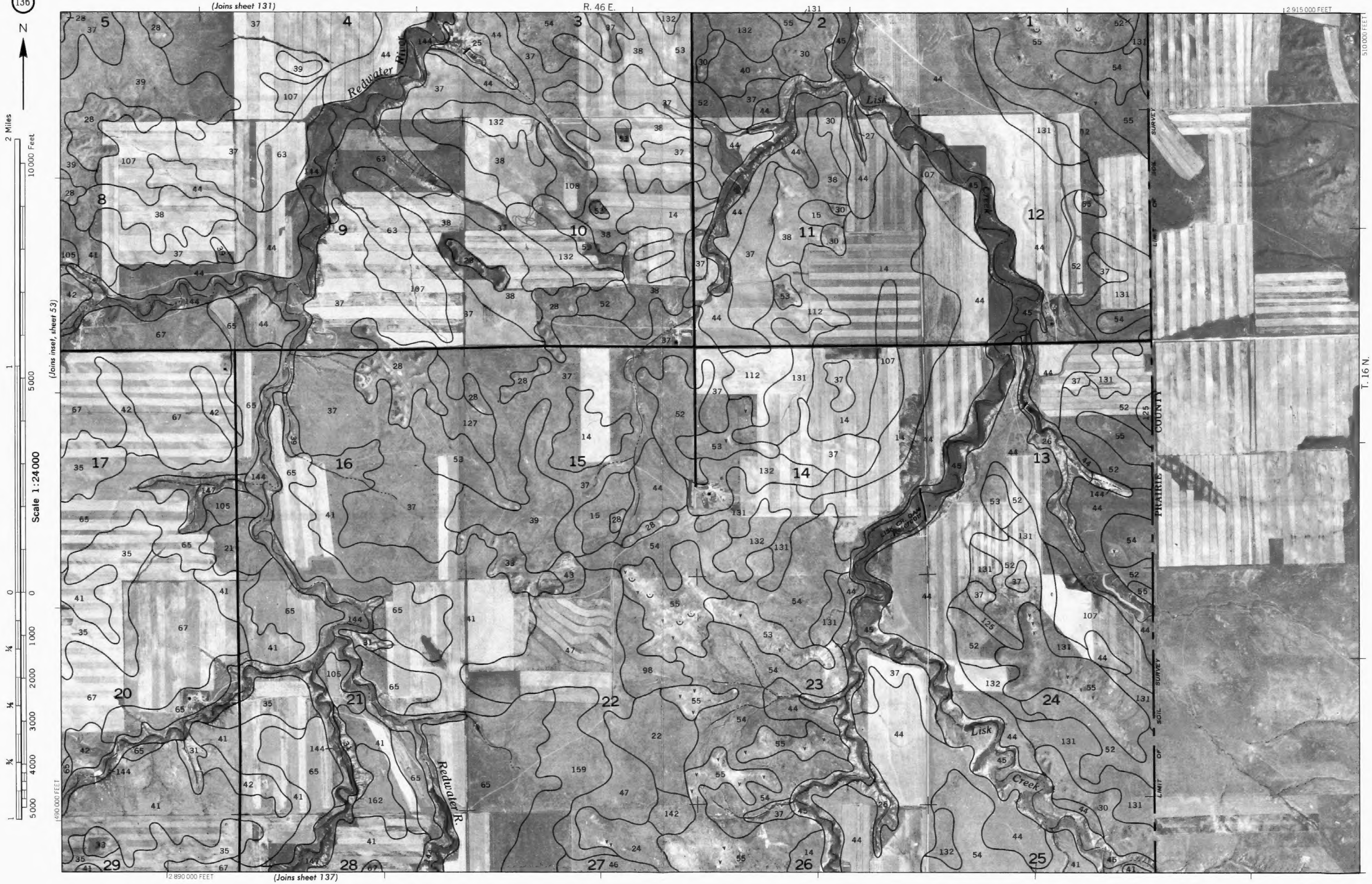




This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

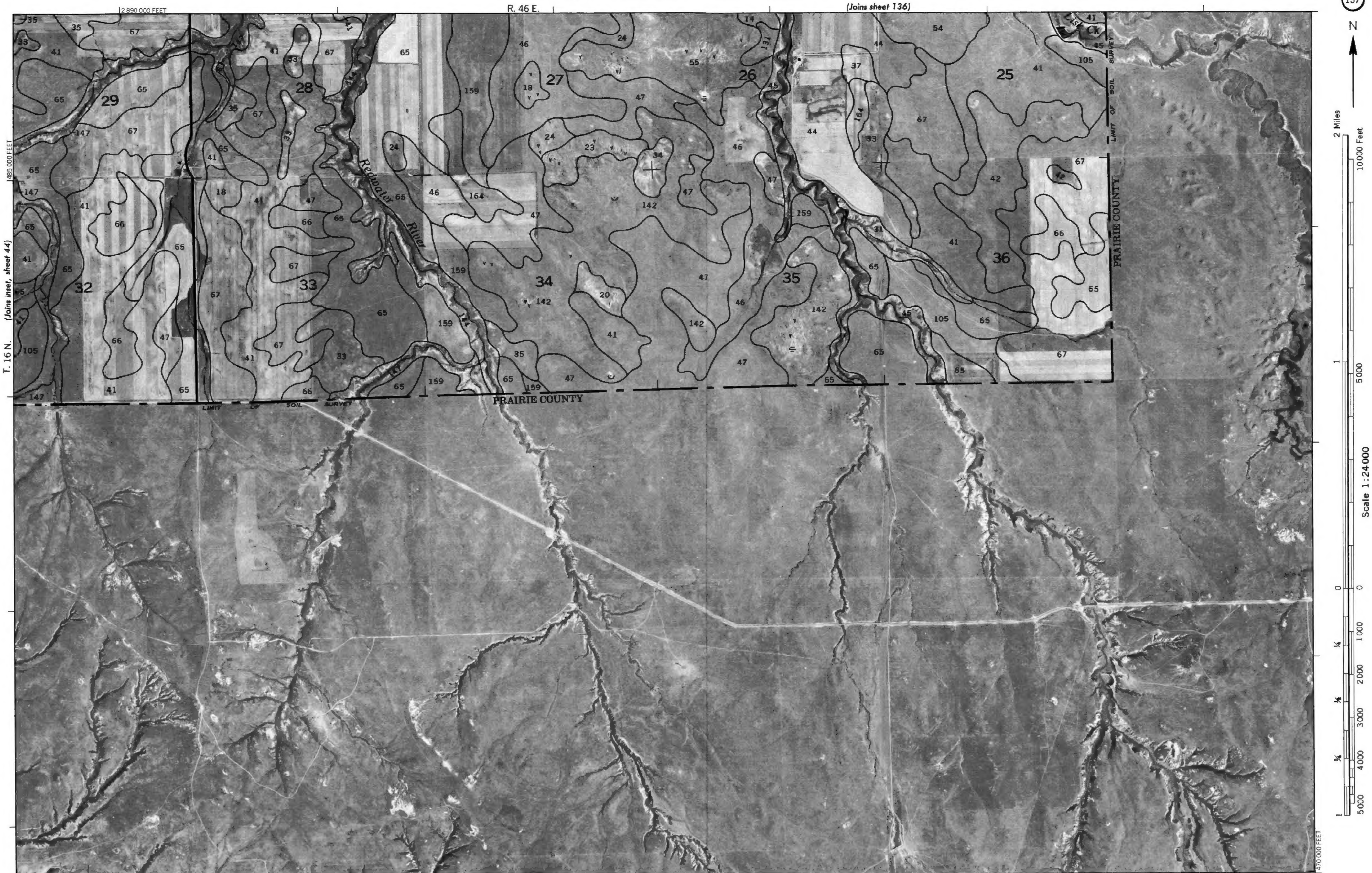
136

McCONE COUNTY, MONTANA — SHEET NUMBER 136



This map is compiled on 1970 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

McCONE COUNTY, MONTANA — SHEET NUMBER 137



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